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ABSTRACT

A study was conducted to construct a preliminary version of a shortened form of the Occupation Analysis Inventory (OAI:SF). (The OAI is an instrument containing 622 work elements which are descriptions of work activities and conditions on which jobs and occupations are rated. The work elements were generated within a broad framework of five components: (1) information received, (2) mental activities, (3) observable behavior, (4) work outcomes (compared to goals), and (5) work context.) The development of a 229 item-OAI:SF was based on ninety work-dimensions derived through factor analysis of the 622 OAI work elements. Ratings on the OAI:SF of 150 jobs by four raters were used to compute inter-rater reliabilities for the 229 items. Those reliabilities were substantial. The validity of the short form was examined by determining the extent to which ratings with OAI:SF yielded information similar to those obtained from the OAI in terms of factor scores and human attribute requirements. The results indicate that ratings with the OAI and OAI:SF yield similar factor score information about jobs and substantially the same attribute information. The feasibility of developing a short form of the OAI based on the OAI work dimensions was supported by the results. (The appendix comprises two-thirds of this report and includes OAI:SF; the attribute requirements; inter-rater reliability coefficients; reliability estimates of OAI:SF items and attribute requirement; and correlations of attribute requirement estimates and factor scores of OAI:SF with OAI.) (EM)

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THE INITIAL DEVELOPMENT AND VALIDATION OF A SHORT FORM OCCUPATION ANALYSIS INVENTORY BASED ON SYSTEMATICALLY DERIVED WORK DIMENSIONS

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Toward an Educational System Articulated with Adult Society

CENTER FOR OCCUPATIONAL EDUCATION
North Carolina State University at Raleigh

May, 1975

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TABLE OF CONTENTS

	Page
LIST OF TABLES	iv
INTRODUCTION	1
PURPOSE	3
PROCEDURES	4
The Occupation Analysis Inventory (OAI)	4
Development of the Occupation Analysis Inventory: Short Form (OAI:SF)	4
Validation of the Occupation Analysis Inventory: Short Form (OAI:SF)	5
The Occupation Analysis Inventory: Short Form (OAI:SF)	6
The Attribute Requirement Inventory (ARI)	6
Occupation Analysis Inventory Factor Score Profiles	7
General Aptitude Test Battery (GATB) Average Aptitude Score Profiles	7
Rating Procedures	8
Raters	8
Occupation Analysis Inventory: Short Form Job Ratings	8
Attribute Requirement Inventory Estimates	9
Factor Score Estimates	9
Analyses	9
OAI:SF Reliability Estimates	10
Reliability of Attribute-Requirement Estimates	10
Correlation of Attribute-Requirement Estimates from OAI Ratings with Those from OAI:SF Ratings Over 150 Jobs	11
Correlation of OAI Factor Scores with OAI:SF Factor Score Estimates for 133 Jobs	11
Correlation of GATB Average Aptitude Scores with Selected OAI:SF Attribute-Requirement Estimates	12
RESULTS	13
Item Reliabilities of OAI:SF Ratings	13
Reliabilities of the Attribute-Requirement Estimates	13
Correlation of OAI Attribute-Requirement Estimates with OAI:SF Attribute-Requirement Estimates	16
Correlation of OAI Factor Scores with Factor Score Estimates from the OAI:SF	16
Correlation of GATB Average Aptitude Scores with Selected OAI:SF Attribute-Requirement Estimates	19

Page

DISCUSSION 24

REFERENCES 26

APPENDICES 28

Appendix A: Occupation Analysis Inventory: Short Form. 29
Appendix B: List of Attribute Requirement Inventory Titles. . . . 126
Appendix C: Inter-Rater Reliability Coefficients of 90 First-Order Factors Derived from the OAI. 130
Appendix D: Reliability Estimates of OAI Short Form Items Based on Occupational Rating Data 134
Appendix E: Reliability Estimates of Attribute Requirement Ratings 140
Appendix F: Correlation of Attribute-Requirement Estimates from the OAI: Short Form with Attribute-Requirement Estimates from the OAI: Long Form (Across 150 Jobs). 144
Appendix G: Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations). 148
Appendix H: Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations) Corrected for Attenuation due to Rater Unreliability in OAI Factor Scores. 151

LIST OF TABLES

Table		Page
1.	Frequency Distribution of the Unadjusted Coefficients of Reliability of the Mean Rating of 4 Raters on the 229 OAI: Short Form Items (Based on the Occupational Rating Data	14
2.	Frequency Distribution of the Unadjusted Coefficients of Reliability for the Mean Rating of 229 OAI: Short Form Items on 103 Human Attributes.	15
3.	Frequency Distribution of Correlations of Attribute-Requirement Estimates from the OAI: Short Form with Attribute-Requirement Estimates from the OAI: Long Form (Across 150 Occupations).	17
4.	Frequency Distribution of Correlations of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations).	18
5.	Frequency Distribution of Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations) Corrected for Attenuation due to Rater Unreliability in the OAI Factor Scores.	20
6.	Correlations Between OAI Attribute-Requirement Estimates and Mean GATB Scores for Jobs.	23
7.	Inter-Rater Reliability Coefficients of 90 First-Order Factors Derived from the OAI (n = 215 jobs).	C-1
8.	Reliability Estimates of OAI Short Form Items Based on Occupational Rating Data.	D-1
9.	Reliability Estimates of Attribute Requirement Ratings	E-1
10.	Correlation of Attribute-Requirement Estimates from the OAI: Short Form with Attribute-Requirement Estimates from the OAI: Long Form (Across 150 Jobs)	F-1
11.	Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations)	G-1
12.	Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations) Corrected for Attenuation due to Rater Unreliability in OAI Factor Scores	H-1

INTRODUCTION

The research reported here was part of a long-range effort, the Ergometric Research and Development Project, directed toward the development of a quantitative occupational taxonomy applicable to occupationally related education and guidance.

The Ergometric Project began with the development of the Occupation Analysis Inventory (OAI), containing 622 "work elements" (descriptions of different types of work activities and conditions) on which jobs and occupations are rated (Cunningham, Tuttle, Floyd, and Bates, 1971). The OAI work elements were generated within a broad information-processing framework consisting of the following components: (a) Information Received, (b) Mental Activities, (c) observable Behavior, (d) Work Outcomes (compared to goals), and (e) Work Context. These major components were, in turn, subdivided according to selected conceptual frameworks pertaining to human behavior and work technology, and the work elements were developed within the resultant subcategories. The completed instrument represented an attempt to achieve as much specificity (or content loading) in occupational description as possible, while retaining its applicability to the entire occupational spectrum (i.e., without limiting the instrument to a restricted range of jobs and occupations).

Since its construction, the OAI has been applied to 1414 jobs, and the job-rating data have been subjected to a series of factor analyses that have reduced the 622 OAI work elements to a lesser number of basic work dimensions. In one study, Riccobono and Cunningham (1971) factor analyzed seven different sections of OAI work elements using the OAI ratings of 814 jobs. Those seven sectional analyses produced 90 first-order factors, or "work dimensions," representing basic types of work activities and conditions.

Although the OAI has proved to be reliable and valid, rating a job on the 622-item OAI is a rather formidable task; experienced job analysts require two to three hours to rate one written job description (U. S. Employment Service job schedule) on this instrument. Initially, a large number of work elements was required to ensure adequate coverage at the level of descriptive specificity sought in the OAI. It should now be possible, however, to construct a much shorter form of the OAI without an appreciable loss in information. Thus, if the items in the short form were based on the work dimensions (factors) derived from the original (622-item) OAI, a threefold reduction in instrument length could be attained. Yet, despite this reduction in length, it should be possible to rate a job on the short form and still describe it at a level of specificity comparable to the original OAI, since the work dimensions on which the short-form items would be based are defined by the original OAI work elements. A short form of the OAI would increase the feasibility of large-scale taxonomy development, as well as other research and development activities

requiring quantitative descriptions of large numbers of jobs or occupations.

The present report deals with the first phase in the development of a short-form OAI.

PURPOSE

As indicated, the Occupation Analysis Inventory (OAI) contains a comprehensive set of 622 "work elements" describing various kinds of work activities and conditions. Through factor analysis, the OAI work elements have been reduced to 90 more basic "work dimensions." Using the 622-item OAI, a trained analyst requires two to three hours to rate a job or occupation. That rating time might be reduced appreciably, however, by a short form of the OAI containing items based on the work dimensions (factors) derived from the original OAI work elements.

The purpose of this study was to construct a preliminary version of an OAI Short Form and perform reliability and validity analyses on the new instrument. There were five main objectives in the study:

(1) To construct a first-stage version of an OAI Short Form (OAI:SF) containing items based on the OAI work dimensions (factors).

(2) To determine the inter-rater reliabilities of the OAI:SF items.

(3) To correlate work-dimension scores based on the OAI:SF ratings of a sample of jobs with work-dimension scores based on the original OAI ratings of the same jobs.

(4) To correlate the OAI:SF-derived attribute-requirement estimates for a sample of jobs with the original OAI attribute-requirement estimates for the same jobs.

(5) To correlate selected OAI:SF ability-requirement estimates for a sample of jobs with the mean General Aptitude Test Battery scores of job incumbents.

PROCEDURES

The procedures involved in the development and validation of the preliminary version of the short form of the Occupation Analysis Inventory are described in the following sections. The Occupation Analysis Inventory which was the basis for the development of the short form is described below.

The Occupation Analysis Inventory (OAI)

The Occupation Analysis Inventory (OAI) is a rating device designed for the systematic description of jobs and occupations (Cunningham et al., 1971). The items, or work elements, in the OAI consist of written descriptions of classes of work activities or conditions, along with specific examples for each class. The Inventory contains 622 work elements grouped under the following major headings:

1. Information Received (125 elements)
2. Mental Activities (41 elements)
3. Work Behavior (267 elements)
4. Work Goals (112 elements)
5. Work Context (77 elements)

These five categories correspond to the five components of the information processing model shown in Figure 1.

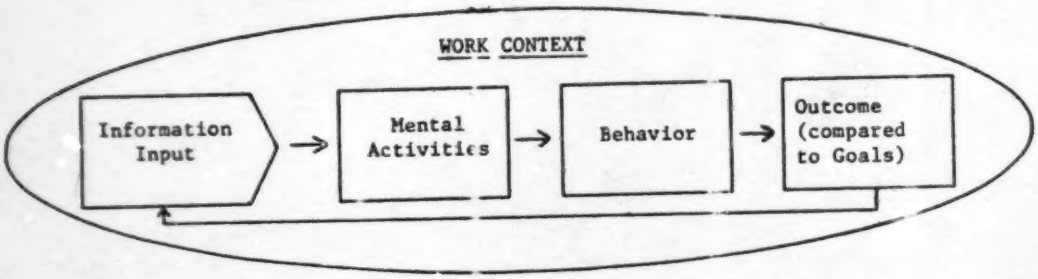

Figure 1. Paradigm of the Occupation Analysis Inventory (OAI)

Development of the Occupation Analysis Inventory: Short Form (OAI:SF)

Using OAI ratings of 814 jobs, factor analysis of the work elements in the OAI was conducted by sections. The "scree test" was used to determine the number of factors to retain for rotation in each section. These factors were rotated obliquely to simple structure. A total of 90 factors were extracted and rotated, 88 of which were interpreted (Riccobono and Cunningham, 1971). These 90 first-order factors formed the structure for the development of the OAI:SF.

Eleven more factors were added as a result of a factor analysis of the responses to the Objects/Materials Acted Upon subsection of Section C, Work Behavior. This analysis was used to reduce complexity of the work dimensions in Section C. For each work dimension (factor), the item content and rotated loadings of the work elements (items) which contribute to the dimension were examined. The decision on the number of short form items necessary to represent each work dimension was based on the similarity of the work elements in the dimension. This similarity was considered in terms of both the content and the rotated loadings of the items on the dimension.

When all the work elements in a dimension had similar content and had similar loadings on the work dimension, a single short form item was written to represent the dimension. Where distinct content areas were found in the elements, additional short form items were necessary to represent the dimension. Usually, the distinct content of the work element groups was reflected in different loadings being associated with each content area. Thus, all work elements with similar content and having rotated loadings with a small range of values were considered as a single group distinct from other elements with dissimilar content. Most of the 90 work dimensions required two short form items to reflect this diversity of content of the work elements. The ten OAI Sensory Channel work elements and the 17 Incentive work elements were not included in the factor analyses (Riccobono and Cunningham, 1971). These 27 elements were placed intact in the OAI:SF.

The 622-work element OAI was reduced to a 229-item short form by these procedures. On this short form, experienced analysts require an average of one to one and one-half hours to rate one written job description (U. S. Employment Service job schedule) as compared with the average of two and one-half to three hours required for an experienced rater to rate with the OAI.

Validation of the Occupation Analysis Inventory Short Form (OAI:SF)

The validity of the OAI:SF was examined in terms of (a) the overlap of estimated factor scores on the OAI:SF with factor scores from the OAI, (b) the overlap of OAI:SF-derived attribute-requirement estimates of jobs with OAI-derived attribute-requirement estimates, and (c) the extent to which OAI:SF-derived attribute estimates for jobs can account for average aptitude test scores (GATB) on the same jobs. Ratings of 150 jobs by four raters were used to examine OAI:SF item reliabilities.

The following materials were employed in these analyses: the Occupation Analysis Inventory: Short Form (OAI:SF), the Attribute Requirement Inventory (ARI), Occupation Analysis Inventory (OAI) Factor Score Profiles, and General Aptitude Test Battery (GATB) Average Score Profiles.

The Occupation Analysis Inventory: Short Form (OAI:SF)

The OAI:SF (Appendix A) is a 229-item instrument for use in describing or rating jobs. As described previously, this instrument is based on the 90 first-order factors derived from the 622-item Occupation Analysis Inventory. The OAI:SF was developed to reduce the time required to rate a job while yielding most of the same information obtained with the OAI.

The Attribute Requirement Inventory (ARI)

The Attribute Requirement Inventory (ARI) contains 103 definitions of human attributes that have been identified as potentially useful in describing the human requirements of jobs. These attributes fall into the following six categories:

1. General Vocational Capabilities (24 attributes)
2. Cognitive Abilities (20 attributes)
3. Psychomotor Abilities (12 attributes)
4. Sensory Capacities (6 attributes)
5. Interests (24 attributes)
6. Needs (17 attributes)

A list of the ARI attribute titles is presented in Appendix B.

The attributes included in the ARI were selected for several reasons. First, those attributes selected were considered to be most representative of the attributes consistently identified in each area (i.e., Cognitive Abilities, Interests, Needs, etc.). Second, only attributes considered suitable for job analysis purposes were included. Third, in the case of General Vocational Capabilities, Cognitive Abilities, Interests, and Needs, attributes were selected for which there were easily administered tests.

The General Vocational Capabilities were selected from those defined by Altman (1966). These attributes represent knowledges and skills relevant to a wide variety of occupations but which are more occupationally specific than basic aptitudes and academic abilities.

The Cognitive Abilities were adapted, for the most part, from those described by French, Ekstrom, and Price (1963). The abilities measured by the General Aptitude Test Battery (GATB) of the U. S. Employment Service and the Differential Aptitude Test (DAT) Battery (Bennett, Seashore, and Wesman, 1966) are also represented in the ARI. (Most of the GATB and DAT tests can be matched with factors identified by French et al.) The factors presented by French et al. were selected from the many cognitive factors identified by various researchers.

The Psychomotor Abilities were adapted from the factors identified in a series of studies by Fleishman (1967). The psychomotor factors included in the ARI were selected on the same bases as the cognitive abilities.

The Interests defined in the ARI were adapted from the Ohio Vocational Interest Survey (1969). The conceptual approach used in the development of the Ohio Vocational Interest Survey (OVIS) was borrowed from the Data-People-Things scheme employed by the U. S. Employment Service. In the derivation of the OVIS scales, the 114 worker trait groups identified in the Dictionary of Occupational Titles (DOT) were plotted in three-dimensional space using the dimensions of Data, People, and Things.

The Needs were adapted from the Minnesota Importance Questionnaire (MIQ), which was one of a number of instruments developed in accordance with the Theory of Work Adjustment (Weiss et al., 1966). The 20 scales of the instrument were derived from studies of need fulfillment carried out by many researchers.

Occupation Analysis Inventory Factor Score Profiles

The Occupation Analysis Inventory (OAI) contains 622 items (or work elements) grouped under five major categories. These are:

1. Information Received
2. Mental Activities
3. Work Behavior
4. Work Goals
5. Work Context

In previous studies, 1414 occupations were rated using the 622-item OAI. Work dimensions were derived through a systematic analysis of 814 of these job ratings, resulting in 90 first-order factors. First-order factor score profiles were derived for these 814 jobs. As part of the validation study of the OAI:SF, factor score profiles from OAI ratings on 133 jobs were compared with estimated factor score profiles of the same 133 jobs obtained from ratings with the OAI:SF.

General Aptitude Test Battery (GATB) Average Aptitude Score Profiles

Average GATB score profiles for specific occupations were obtained from the table "GATB Data on Aptitudes for Specific Occupations" in the Manual for the General Aptitude Test Battery, Section III: Development (U. S. Department of Labor, 1967). This table lists occupations by title alphabetically and includes the occupation's

Dictionary of Occupational Titles code and the mean (average) score of the sample of workers on each of the nine aptitudes of the GATB. These are: G--Intelligence, V--Verbal Aptitude, N--Numerical Aptitude, S--Spatial Aptitude, P--Form Perception, Q--Clerical Perception, K--Motor Coordination, F--Finger Dexterity, and M--Manual Dexterity. In the OAI:SF validity analysis involving the GATB Average Aptitude Score Profiles, G--Intelligence, or general learning ability, was not employed.

Rating Procedures

Raters

The raters in this study were recruited from the Department of Psychology of North Carolina State University at Raleigh. All of the seven raters were graduate students with some measurement background. Four of the seven raters had received their Master of Science degree.

Occupation Analysis Inventory: Short Form Job Ratings

Each of the four job raters was given a copy of the OAI:SF, a set of instructions (see Appendix A), a number of answer sheets, and three practice jobs. Each rater was given a ten-hour period of training which included study of the OAI:SF and instructions, experience rating the practice jobs, and discussion of problems encountered. After this training, each rater was given 150 job descriptions and was asked to rate each job on each of the 229 OAI:SF items, using the scale indicated for the item.

Three types of scales were used in the OAI:SF ratings: (1) the Significance Scale (S), on which the rater was asked to indicate the significance of the element to the job, with a value ranging from 0-9; (2) the Extent Scale (E), on which the rater was asked to indicate the extent to which the OAI:SF work element applied to or occurred in the job, using a 0-9 scale; and (3) the Special Scale (*), which appears throughout the OAI:SF. Located just after the identification number of each item is the code (S, E, or *) which designates the scale which should be used in rating that item.

The same 150 occupations were rated by each rater, which allowed the computation of reliability estimates and the averaging of ratings over four raters for greater stability. When the rating forms were returned, they were checked for completeness and coded by rater, job rated, and OAI:SF section. The ratings were then punched into data processing cards.

Attribute Requirement Inventory Estimates

Each of four attribute requirement raters was given a copy of the OAI:SF, a copy of the ARI, a number of answer sheets, and a set of instructions (Neeb, Cunningham, and Pass, 1971). The raters were asked to read the OAI:SF, the ARI and the instructions to prepare for rating.

The raters were instructed to read carefully one attribute definition in the ARI and then read and rate each of the OAI:SF items in terms of the (0-5) "Degree of Relevance" of the attribute to the work element described in that OAI:SF item. This procedure was followed until all OAI:SF items had been rated on all ARI items.

Since two categories of attributes defined in the ARI appeared inherently different, "Degree of Relevance" was defined for the General Vocational Capabilities, Cognitive Abilities, Psychomotor Abilities, and Sensory Capacities as the "amount" or "level" of the attribute in question required of the incumbent to deal effectively with the OAI:SF item. For Interests and Needs, however, "Degree of Relevance" was defined as the extent to which the attribute in question was "compatible" with the OAI:SF item. When rating each OAI:SF work element, the raters assumed that element to be a very significant part of a hypothetical job.

When the rating forms were returned, they were checked for completeness and coded by rater, attribute, and OAI:SF section. The ratings were then punched into data processing cards.

Factor Score Estimates

The OAI:SF items were written to represent the 90 first-order factors derived from the analysis of 814 OAI job ratings. As the items were written, the rotated factor loadings of the OAI items which contributed to the factor were noted, and an estimate factor loading was made for each OAI:SF item. Factor score estimates were obtained from OAI:SF ratings by multiplying the rating on each item by the estimated factor loading for that item. The original factor loadings were used for the 27 Sensory Channel and Incentive OAI work elements, which were placed intact into the OAI:SF.

Analyses

After all data had been collected, the following analyses were carried out. All of the statistical calculations were performed on an IBM 370/165 computer.

OAI:SF Item Reliability Estimates

Since the present study marked the initial application of the OAI:SF, it was necessary to estimate the reliability of rating with each OAI:SF item. Four graduate research assistants were employed for this purpose. After a ten-hour period of training, each rater used the OAI:SF to rate the same 150 jobs from USES written work schedules. The 150 jobs were selected from USES job schedules (n = 1414) which had been used for research with the OAI. These 150 jobs were selected to be representative of the work force distribution according to the 1970 census, and to include a large portion of jobs for which USES General Aptitude Test Battery (GATB) group means were available.

In order to increase the stability of the OAI:SF job ratings, the average of the four raters on each item was computed for each job. These average job ratings were used in the derivation of attribute requirement estimates and factor score estimates for the 150 jobs.

An analysis-of-variance procedure (Winer, 1962) was used to compute inter-rater reliability coefficients for each of the 209 OAI:SF items; observations consisted of ratings of 150 occupations on the 229 OAI:SF work elements. Four coefficients of reliability were computed for each attribute. The first two coefficients were computed from unadjusted data. One, the intraclass correlation coefficient, represents the reliability for a single hypothetical rater and is approximately equal to the mean intercorrelation between all pairs of raters for a particular attribute. The second coefficient represents the reliability of the mean ratings across all raters for the attribute in question. This latter reliability coefficient can be interpreted as the approximate correlation which would be obtained if the mean ratings of this study were correlated with the mean ratings obtained in another study using a new sample of raters (i.e., a sample of the same size drawn randomly from the same population). The last two reliability coefficients were adjusted for differences in the raters' frames of reference. Although these coefficients correspond to the first two coefficients, they are usually higher, since they contain no error due to systematic differences in rating tendencies.

Reliability of Attribute Requirement Estimates

Since estimates of the attribute requirements of the OAI:SF items were derived for this study, it was necessary to examine the reliability of these estimates. Four graduate students were employed for this purpose. After training, each rater used the 103-item Attribute Requirement Inventory (ARI) to rate each of the 229 OAI:SF items. An examination of the ratings revealed that one rater had failed to follow the additional instructions for the Interests and Needs Sections. Thus, reliabilities were computed over four raters for the first 62 items and over three raters for the remaining 41 items.

In order to increase the stability of the attribute-requirement estimates, the averages of the four raters for the first 62 items and the three raters for the remaining 41 items were computed. The average attribute-requirement estimates were used in deriving the attribute-requirement estimates of the 150 jobs rated with the OAI:SF.

The analysis-of-variance procedure (Winer, 1962) used to compute reliabilities for the OAI:SF work elements was also used to compute reliabilities for the 103 ARI attributes. The observations consisted of attribute ratings for the 229 OAI:SF work elements. The procedure is described in more detail in the preceding section on reliability estimates for the OAI:SF.

Correlation of Attribute-Requirement Estimates from OAI Ratings with Those from OAI:SF Ratings Over 150 Jobs

In this analysis, the attribute-requirement estimates of 150 occupations previously rated with the OAI were compared with attribute-requirement estimates obtained from OAI:SF ratings of the same 150 jobs. Essentially, ratings on the OAI and the OAI:SF were put into a common (or single) scale of ARI estimates. Correlations of these estimates were then computed in order to examine the extent to which the OAI and OAI:SF yielded the same attribute information about jobs.

Correlation of OAI Factor Scores with OAI:SF Factor Score Estimates for 133 Jobs

In this analysis, scores on 88 of the 90 first-order factors were compared with estimates of these factor scores derived from OAI:SF job ratings. These comparisons were made over 133 jobs for which OAI factor scores and OAI:SF ratings were available. The purpose of this analysis was to determine the similarity of OAI ratings with OAI:SF ratings in terms of the 88 OAI first-order factors which were interpreted (Riccobono and Cunningham, 1971). These correlations examined the extent to which the OAI and OAI:SF yielded the same factor or work dimension information about jobs.

Two additional analyses were conducted to examine further these correlations.

In the first analysis, the relationship of these correlations to OAI rater reliabilities was determined in order to examine whether the extent to which the OAI raters were reliable in rating jobs on a work dimension was associated with the ability of the OAI:SF factor estimates to reflect that work dimension. In this analysis, the OAI inter-rater reliability coefficients and the correlations of OAI factor scores with OAI:SF factor score estimates were normalized using the Fisher r to Z transformation. The resulting Z scores were correlated to obtain an

index of the extent to which rater reliability on the OAI work dimensions covaried with the reproduction of these work dimensions on the OAI:SF.

Rater reliabilities on the OAI work dimensions were obtained from an analysis of reliability of two rater sets rating 215 jobs on the 90 OAI first-order job factors. The results are presented in Appendix C. The unadjusted correlation coefficients were used for the analysis.

In the second analysis, the extent to which the OAI:SF factor score estimates would have correlated with the OAI factor scores if the OAI raters had been perfectly reliable was examined. In this analysis, the correlations between factor scores from OAI ratings and factor score estimates from OAI:SF ratings were corrected for attenuation due to lack of rater reliability in the OAI ratings. The results of this analysis suggest the extent to which the factor score estimates from the OAI:SF would have correlated with the OAI work dimensions if the OAI factors had been totally reliable.

Correlation of GATB Average Aptitude Scores with Selected OAI:SF Attribute-Requirement Estimates

In this analysis, average aptitude scores of a sample of incumbents in 125 occupations, on eight of the nine General Aptitude Test Battery Aptitudes, were correlated with corresponding attribute-requirement estimates derived from OAI:SF ratings of the same 125 occupations. This same analysis, using OAI ratings of 200 jobs, had been employed in the validation of OAI aptitude requirement estimates of jobs (Bates and Cunningham, in press).

Since the same GATB aptitudes and ARI attributes were employed in both the OAI and OAI:SF analyses, it was decided to examine the similarity of the results in greater depth. The purpose of this additional analysis was to examine whether OAI and OAI:SF job ratings would yield similar information in terms of GATB aptitudes.

The intercorrelations of the average GATB aptitude scores with attribute-requirement estimates for the OAI and OAI:SF were first normalized using the Fisher r to Z transformation. The resulting Z scores for the OAI:SF aptitude/attribute intercorrelations were then correlated with the Z scores for the equivalent OAI aptitude/attribute intercorrelations, thus yielding an index of the overlap of GATB aptitude-related information yielded by OAI and OAI:SF job ratings.

RESULTS

The presentation of the results is organized in accordance with the preceding description of the analyses.

Item Reliabilities of OAI:SF Ratings

The results of this phase of the study are generally encouraging. Indices of inter-rater agreement on the OAI:SF ratings were computed for each of the 229 items, treating the 150 jobs as cases and individual raters as variables (Winer, 1962). The unadjusted coefficient for mean ratings was selected as the most representative reliability index. This index is not adjusted for differences in rater tendencies. Table 1 contains a frequency distribution of the unadjusted reliability coefficients for mean ratings. One hundred ninety-three, or 84 percent, of the items were found to have inter-rater reliabilities of .70 or greater. The median of the distribution falls in the .85 - .89 interval. These results compare favorably with a reliability study of the original OAI in which approximately 70 percent of the items were found to have inter-rater reliabilities below .70 (Riccobono and Cunningham, 1971). It should be noted that, in this earlier study, the reliabilities were estimated for two independent composite raters which were formed from four raters each. The resulting reliability estimates were, therefore, spuriously low.

The results of the OAI:SF reliability analysis are presented in Appendix D. The inter-rater reliabilities appear to support the use of average ratings over the four raters to give greater stability to the job ratings.

Reliabilities of the Attribute-Requirement Estimates

Indices of inter-rater agreement on the attribute ratings were computed for each of the 103 ARI attributes, treating the 229 OAI:SF work elements as cases and individual raters as variables (Winer, 1962). The four different reliability estimates obtained for each attribute are shown in Appendix E. Table 2 contains a frequency distribution of the unadjusted reliability coefficients for mean ratings. The median of this distribution falls in the .75 - .79 interval. Each coefficient is an estimate of the reliability of the mean ratings of 229 OAI:SF work elements on a single ARI attribute. The unadjusted coefficient for mean ratings was selected as the most representative reliability index, instead of the coefficient adjusted for differences in rating tendencies, since such differences affect the mean attribute profiles (especially with small groups of raters).

Table 1. Frequency Distribution of the Unadjusted Coefficients of Reliability of the Mean Rating of 4 Raters on the 229 OAI:Short Form Items (Based on the Occupational Rating Data)

Coefficient of Reliability	Frequency	Proportion	Cumulative Proportion
.95 - 1.00	6	.026	.999
.90 - .94	56	.245	.974
.85 - .89	53	.231	.729
.80 - .84	40	.175	.498
.75 - .79	24	.105	.323
.70 - .74	14	.061	.218
.65 - .69	13	.057	.157
.60 - .64	6	.026	.100
.55 - .59	4	.017	.074
.50 - .54	4	.017	.057
.45 - .49	0	.000	.039
.40 - .44	2	.009	.039
.35 - .39	1	.004	.031
.30 - .34	1	.004	.026
> .29	5	.022	.022

Table 2. Frequency Distribution of the Unadjusted Coefficients of Reliability for the Mean Rating of 229 OAI:Short Form Items on 103 Human Attributes

Coefficient of Reliability	Frequency	Proportion	Cumulative Proportion
.95 - 1.00	2	.019	.999
.90 - .94	6	.058	.981
.85 - .89	22	.214	.922
.80 - .84	14	.136	.709
.75 - .79	11	.107	.573
.70 - .74	18	.175	.466
.65 - .69	9	.087	.291
.60 - .64	3	.029	.204
.55 - .59	6	.058	.175
.50 - .54	4	.039	.117
.45 - .49	1	.010	.078
.40 - .44	1	.010	.068
.35 - .39	1	.010	.058
.30 - .34	0	.000	.049
> .29	5	.049	.049

Correlation of OAI Attribute-Requirement Estimates with OAI:SF Attribute-Requirement Estimates

Product-moment correlations of OAI attribute-requirement estimates with OAI:SF attribute-requirement estimates were computed in order to examine the extent to which ratings with the OAI and with the OAI:SF yielded the same attribute information about jobs. The correlations obtained for 102 of the 103 ARI items are shown in Appendix F. No correlation was computed for Item 96, Moral Values, because this item was found to have yielded an unacceptably low reliability coefficient on the OAI ratings (Neeb, Cunningham, and Pass, 1971).

Table 3 contains a frequency distribution of the correlation of OAI attribute estimates with OAI:SF attribute estimates. The median of this distribution falls in the .80 - .84 interval. All of the correlations are considerably above .254, which is the smallest correlation which would be significant at the .01 level for a single correlation with 100 degrees of freedom (Arkin and Colton, 1950).

Correlation of OAI Factor Scores with Factor Score Estimates from the OAI:SF

Product-moment correlations of OAI factor scores with OAI:SF factor score estimates were computed for 133 jobs in order to examine the extent to which the OAI:SF yields the same information as the OAI on 88 work dimensions. The 88 work dimensions resulted from a factor analysis of OAI ratings of 814 jobs. This factor analysis yielded 90 first-order factors, of which 88 were considered to be interpretable (Riccobono and Cunningham, 1971). The correlations obtained for the 88 interpretable factors are shown in Appendix G.

Table 4 presents a frequency distribution of the correlations of OAI factor scores with OAI:SF factor score estimates on 88 work dimensions. The median of this distribution falls in the .65 - .69 interval. With one exception these correlations are above .174, which is the smallest correlation which would be significant at the .05 level for a single correlation with 125 degrees of freedom (Arkin and Colton, 1950).

The second analysis examined the relationship of OAI factor scores with OAI:SF factor score estimates in greater depth. In this analysis, the relationship between OAI rater reliability on the work dimensions and the ability of the OAI:SF factor score estimates to replicate these dimensions was examined. The OAI factor-score inter-rater reliabilities (Appendix C) and the correlations of OAI factor scores with OAI:SF factor score estimates (Appendix G) were normalized using the Fisher r to Z transformation (Hays, 1963). The resulting Z scores were correlated, yielding an index of the extent to which rater

Table 3. Frequency Distribution of Correlations of Attribute-Requirement Estimates from the OAI:Short Form with Attribute-Requirement Estimates from the OAI:Long Form (Across 150 Occupations)

Correlation OAI:SF Attribute Estimate with OAI:LF Attribute Estimate	Frequency	Proportion	Cumulative Proportion
.95 - 1.00	0	.000	.999
.90 - .94	4	.039	.999
.85 - .89	28	.275	.961
.80 - .84	29	.284	.686
.75 - .79	20	.196	.402
.70 - .74	15	.147	.206
.65 - .69	2	.020	.060
.60 - .64	2	.020	.040
.55 - .59	1	.010	.0202
.50 - .54	1	.010	.010
> .49	0	.000	.000

Table 4. Frequency Distribution of Correlation of OAI:Short Form Factor Score Estimates with OAI:Long Form Factor Scores (Across 133 Occupations).

Correlation OAI:SF Factor Estimate with OAI:LF Factor Scores	Frequency	Proportion	Cumulative Proportion
.95 - 1.00	0	.000	.999
.90 - .94	2	.022	.999
.85 - .89	3	.034	.977
.80 - .84	11	.125	.943
.75 - .79	15	.170	.818
.70 - .74	12	.136	.648
.65 - .69	8	.091	.511
.60 - .64	5	.057	.420
.55 - .59	5	.057	.364
.50 - .54	6	.068	.307
.45 - .49	4	.045	.239
.40 - .44	5	.057	.193
.35 - .39	6	.068	.136
.30 - .34	2	.023	.068
> .29	4	.045	.045

reliability on the OAI work dimensions was related to the ability of OAI:SF job ratings to reproduce these dimensions. A correlation of .587 was obtained from this analysis. This correlation suggests that a substantial part of the OAI work dimension variance which the OAI:SF failed to reproduce was associated with inter-rater unreliability in the OAI job ratings.

Based on this result, an additional analysis was made to estimate the correlations of OAI factor scores with OAI:SF factor-score estimates which would have been obtained if the OAI raters had been completely reliable. In this analysis, the correlations of OAI factor scores with OAI:SF factor-score estimates were corrected for attenuation due to lack of rater reliability in the OAI ratings (Nunnally, 1970). The correlations of OAI factor scores with OAI:SF factor-score estimates, corrected for inter-rater unreliability in the OAI ratings, are shown in Appendix H.

Table 5 presents a frequency distribution of the OAI factor scores with OAI:SF factor-score estimate correlations, corrected for attenuation, on the 88 work dimensions. The median of this distribution falls in the .75 - .79 interval. All of these correlations are above .174, which is the smallest correlation which would be significant at the .05 level for a single correlation with 125 degrees of freedom.

Correlation of GATB Average Aptitude Scores with Selected OAI:SF Attribute-Requirement Estimates

Average GATB aptitude scores of samples of incumbents in 125 occupations were correlated with attribute-requirement estimates derived from OAI:SF ratings of descriptions of the same 125 occupations. In this analysis, average aptitude scores on eight GATB aptitudes were correlated with attribute-requirement estimates for attributes which were equivalent to the aptitudes. The results of these correlations of OAI:SF attribute-requirement estimates with GATB average aptitude scores are presented in Table 6. As was previously found with the OAI (Bates and Cunningham, in press), the OAI:SF job ratings yielded correlations which were quite substantial for the cognitive areas, and which were generally low in the psychomotor domain.

An additional analysis was performed in order to derive additional information about the extent to which OAI and OAI:SF job ratings yield similar information in terms of GATB aptitudes. In this analysis, correlations of aptitude scores with attribute estimates yielded from OAI and OAI:SF ratings were normalized by the Fisher r to Z transformation. The GATB aptitudes and ARI attributes used in both the OAI and OAI:SF analyses were the same. The resulting Z scores for the OAI:SF aptitude/attribute correlations were then correlated with the Z scores for the equivalent OAI aptitude/attribute correlations. This analysis yielded a correlation of .981 for the comparison of OAI with OAI:SF Z score

Table 5. Frequency Distribution of Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations) Corrected for Attenuation due to Rater Unreliability in the OAI Factor Scores

Correlation OAI: SF Factor Estimate with OAI:LF Corrected for Attenuation	Frequency	Proportion	Cumulative Proportion
.95 - 1.00	3	.034	.999
.90 - .94	5	.057	.966
.85 - .89	14	.159	.909
.80 - .84	12	.136	.750
.75 - .79	14	.159	.614
.70 - .74	6	.068	.455
.65 - .69	7	.080	.386
.60 - .64	3	.034	.307
.55 - .59	6	.068	.273
.50 - .54	1	.011	.205
.45 - .49	6	.068	.193
.40 - .44	5	.057	.125
.35 - .39	2	.023	.068
.30 - .34	1	.011	.045
> .29	3	.034	.034

Table 6. Correlations Between OAI Attribute-Requirement Estimates and Mean GATB Scores for Jobs[1]

Attribute	Verbal N=124	Numerical N=124	Spatial N=125	Form Perception N=125	Clerical N=125	Motor Coordination N=125	Finger Dexterity N=123	Manual Dexterity N=123
Verbal Comprehension	.76	.66	.48	.44	.54	.50	.16	.02
Numerical Facility	.49	.61	.39	.35	.42	.37	.23	.04
Visualization	.02	.16	.51	.26	-.06	-.07	.20	.24
Form Perception	-.10	.04	.39	.17	-.14	-.16	.15	.26
Perceptual Speed	.71	.66	.38	.45	.62	.54	.25	-.02
Eye-Hand Coordination	-.38	-.26	.12	-.08	-.39	-.38	.02	.20
Finger Dexterity	-.33	-.23	.14	-.04	-.32	-.33	.08	.21
Manual Dexterity	-.38	-.27	.10	-.11	-.39	-.39	.00	.19
Inductive Reasoning	.69	.66	.64	.47	.44	.38	.20	.10
Deductive Reasoning	.68	.66	.65	.44	.39	.33	.17	.10

[1]For N=125, a correlation of .23 is significant at the .01 level.

conversions for the eight equivalent aptitude-to-attribute comparisons. A correlation of .970 was obtained when all 80 of the Z scores resulting from the intercorrelations of the aptitude scores with attribute-requirement estimates on the OAI were compared with those from the OAI:SF. These results indicate a surprisingly high overlap in GATB-relevant information which is yielded by job ratings on the OAI and on the OAI:SF.

DISCUSSION

The first part of this study involved the construction of a first-stage Occupation Analysis Inventory: Short Form (OAI:SF). The short form was based on 90 work dimensions derived through factor analyses of the original OAI work elements. The 229-item OAI:SF represents a substantial reduction in length from the original OAI, which has 622 items. This reduction in length is reflected in a reduction by one-half or more in the time required to rate a job. Thus, trained raters requiring two to three hours to rate a job description with the original OAI required only one to one and one-half hours to rate with the OAI:SF.

Ratings on the OAI:SF of 150 jobs by four raters were used to compute inter-rater reliabilities for the 229 OAI:SF items. Those reliabilities were substantial. Eighty-four percent of the items were found to have inter-rater reliabilities of .70 or greater; the median of the distribution falls in the .85 - .89 interval. Inter-rater reliabilities were also computed across four raters for the 103 attribute-requirement estimates of the 229 OAI:SF items. Seventy-one percent of those attribute-requirement estimates had inter-rater reliabilities of .70 or greater; the median of this distribution falls in the .75 - .79 interval.

The reliability indices were computed using Winer's (1962) analysis-of-variance procedure. The unadjusted coefficient for mean ratings was selected as the most representative reliability estimate because this index is not adjusted for differences in rater adaptation levels, which do enter into the mean-scale profiles used in this study. On the basis of the substantial inter-rater reliabilities, the item ratings were pooled across raters, and averages were computed to increase the stability of the ratings. This resulted in mean item-score profiles for the 150 jobs rated with the OAI:SF and mean attribute-requirement estimates for the 229 OAI:SF items.

The validity of the short form was examined by determining the extent to which ratings with the OAI:SF yielded information similar to that obtained from ratings with the OAI. Similarity of information was considered in terms of factor scores and in terms of attribute requirements. In addition, attribute-requirement estimates derived from OAI:SF job ratings were correlated with mean GATB scores of incumbents in the same jobs.

In examining the validity of the OAI:SF in terms of factor score information, factor score profiles obtained from OAI ratings of 133 jobs were correlated with factor score estimates derived from OAI:SF ratings of the same 133 jobs. This analysis yielded correlations of OAI factor scores with OAI:SF factor score estimates which ranged from .17 to .92. The median of the distribution was in the .65 - .69 frequency interval. With one exception the correlations exceeded .178,

the value required for significance at the .05 level (Arkin and Colton, 1950). While these findings are not as positive as those of the attribute-requirement analysis (discussed below), they do indicate that ratings with the OAI and OAI:SF yield similar factor score information about jobs. The results of this analysis identify which OAI factors were reasonably well replicated by the OAI:SF and which were poorly represented by their short form factor-score estimates. This information should be useful in the planned revision of the OAI:SF.

In order to examine the validity of the short form in terms of human attribute information, attribute-requirement estimates for the 150 jobs were obtained by multiplying each job's OAI:SF item ratings by the items' attribute-requirement weights. The OAI:SF attribute-requirement estimates for 150 jobs were then correlated with the original OAI attribute-requirement estimates for the same jobs. The resultant correlations ranged from .56 to .94, with a median in the .80 - .84 frequency interval. All correlations were considerably above the .254 value required for significance at the .01 level (Arkin and Colton, 1950). These results indicate that ratings with the OAI long and short forms yield substantially the same information in terms of the 103 ARI attributes.

In a second set of validity analyses, the short form ability-requirement estimates for jobs were correlated with the mean GATB scores of job incumbents. The obtained correlations ranged from .76 to -.38, with a median of .64. These values compare quite favorably with the corresponding values obtained for the original OAI.

The results of this study support the feasibility of developing a short form of the Occupation Analysis Inventory based on the OAI work dimensions (factors). Estimated factor scores and attribute-requirement estimates based on OAI:SF job ratings showed moderate to substantial relationships with corresponding measures based on the original OAI. Moreover, the OAI:SF ability-requirement estimates for jobs showed relationships with the mean GATB scores of job incumbents that equaled or exceeded comparable relationships for the original OAI. It seems reasonable to expect that, with further revision, the OAI:SF will provide an adequate alternative to the original (long-form) OAI.

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APPENDICES

APPENDIX A

OCCUPATION ANALYSIS INVENTORY: SHORT FORM

OCCUPATION ANALYSIS INVENTORY: SHORT FORM

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INSTRUCTIONS

Purpose and Organization of the Inventory

The Occupation Analysis Inventory: Short Form (OAI:SF) is a research instrument designed for use in analyzing jobs and occupations in terms of basic work factors. The instrument is based on the factor analysis of the Occupation Analysis Inventory (OAI). The work factors appear in this instrument under five main category headings:

A. INFORMATION RECEIVED

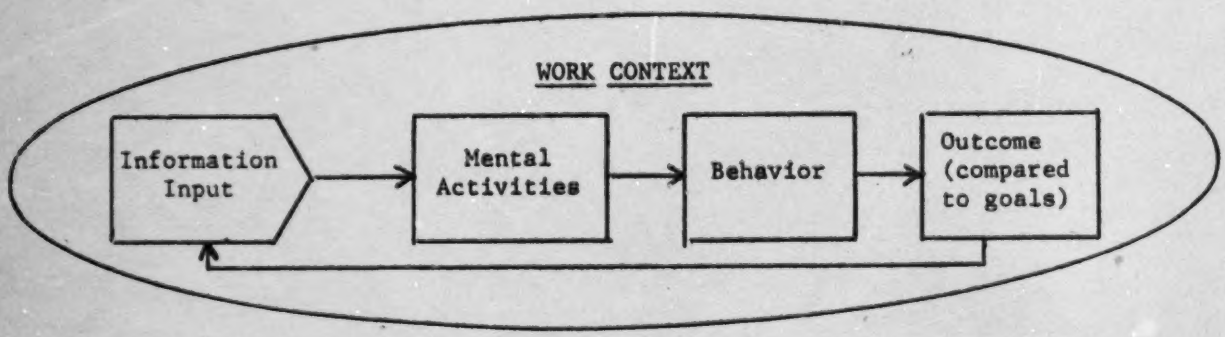
B. MENTAL ACTIVITIES

C. WORK BEHAVIOR

D. WORK GOALS

E. WORK CONTEXT

These category headings correspond to the five components in the information processing model shown below.



The category headings appear on the pages immediately following the yellow divider sheets which separate the categories. The categories are further divided according to the following format:

SUBCATEGORY HEADINGS (appear on white title sheets, typed in all capital letters)

Section Headings (appear on white title sheets, typed in capital and lower case letters)

Group Headings (appear in boxes)

Margin Headings (appear at the left-hand margins of pages, underlined)

The OAI:SF items (work factors) describe various aspects of work activities and conditions. Most of the work factors are illustrated with specific examples. However, these examples are intended only as aids to understanding the idea behind each work factor; they should not be treated as if they accounted for all possible instances of the work factor.

How to Analyze a Job with the Inventory

First, read through the Occupation Analysis Inventory: Short Form (OAI:SF) and become familiar with its contents. You will notice that each item (work factor) is numbered and has a code (a capital letter in parentheses) in front of it. The code designates the scale which should be used in rating a job on the OAI:SF item. The titles of the rating scales and their corresponding codes are as follows:

Code	Scale Title
(S)	Significance
(E)	Extent
(*)	Special Scale (scale appears below the work factor definition)

The (S) and (E) scales are shown on the next two pages. An asterisk indicates that the item has a special scale which will appear in that item and should be used to rate the job on the work element in question.

After thoroughly reviewing the OAI:SF, you should become familiar with the job you are going to analyze. This can be accomplished through exposure to written materials pertaining to the job, interviews with workers and supervisors, observation of work in progress, etc. Do not begin rating the job on the OAI work elements until you are familiar with both the OAI:SF and the job to be analyzed.

Further instructions are presented for various sets of items (work factors) throughout the Inventory. Please read such instructions carefully before rating a job on the items in question. Be sure to rate the job on every OAI:SF item--please do not omit any ratings--and use only the scale indicated for each item.

JOB RATINGS

The first steps in rating a job with the OAI:SF are to become familiar with the job and to identify the job goals. If working from a job description or job analysis schedule, study all the material about the job.

For each OAI:SF item, determine whether or not that element occurs in the job being rated. If it does not occur, the rating is "0." If it does occur, a scale value must be assigned on the basis of the following criteria.

(1) How much of the incumbent's time is spent with that work element?

(2) How important is that work element to the accomplishment of the job goals and family?

(3) In a continuum of all jobs which involve the work element, determine the relative position of the job on this work element.

These steps and criteria should be followed in rating on all scales.

Significance Scale (S)

Consider whether or not the work element in question occurs in the job being rated. If it does not occur, assign the job a rating of "0" on the element. If the element does occur in the job, decide how significant a part of the job that element is. In making your decision, consider and weigh such factors as importance of the element to the job, now frequently that element occurs in the job, the amount of job time required by that element, or any other factor which you think should determine the significance of the element to the job. Use the scale shown below in assigning your rating.

Scale Value	Significance
0	Not a part of the job
1	A very small part of the job
2	
3	A small part of the job
4	
5	A moderately significant part of the job
6	
7	A significant part of the job
8	
9	A very significant part of the job

Extent Scale (E)

Indicate the extent to which the OAI:SF work element applies to or occurs in the job being rated. In making your rating, consider such factors as the frequency or likelihood of occurrence of the work element, the amount of time that it occurs, and the level at or degree to which it occurs in the job.

Scale Value	Extent
0	Does not apply
1	To a very small extent
2	
3	To a small extent
4	
5	To a moderate extent
6	
7	To a considerable extent
8	
9	To a very great extent

A. INFORMATION RECEIVED

THIS CATEGORY OF ITEMS DEALS WITH THE INPUT OF INFORMATION TO THE WORKER. IT IS DIVIDED INTO TWO SUBCATEGORIES: INFORMATION CONTENT AND SENSORY CHANNEL.

INFORMATION CONTENT

THIS SUBCATEGORY OF ITEMS DEALS WITH VARIOUS TYPES OF INFORMATION WHICH ARE USED BY THE INCUMBENT IN PERFORMING HIS JOB. THIS INFORMATION MAY BE USED TO INITIATE OR GUIDE THE INCUMBENT'S IMMEDIATE BEHAVIOR OR IT MAY BE STORED AND USED TO GUIDE HIS SUBSEQUENT BEHAVIOR. JOB INFORMATION IS OF TWO TYPES:

DIRECT INFORMATION IS RECEIVED THROUGH ANY SENSORY CHANNEL AND COMES FROM DIRECT, ON-THE-SCENE CONTACT WITH THE OBJECTS, MATERIALS, DEVICES, SITUATIONS, EVENTS, OR PERSONS IN QUESTION. EXAMPLES OF DIRECT INFORMATION ARE: OBSERVATION OF A MACHINE IN OPERATION, SOUND OF POORLY ADJUSTED VALVES IN AN AUTOMOBILE ENGINE, TACTUAL FEEDBACK FROM AN AUTOMOBILE STEERING WHEEL, SMELL OF ELECTRICAL INSULATION BURNING, TASTE OF FOOD, WATCHING AN ACTOR PERFORM, OBSERVATION OF CLOUD FORMATIONS, SOUND OF PATIENT'S HEARTBEAT, FACIAL EXPRESSION INDICATING A STRONG EMOTION, ETC.

INDIRECT INFORMATION IS AT LEAST ONE STEP REMOVED FROM THE OBJECTS OR EVENTS IN QUESTION. IT IS OBTAINED PRIMARILY FROM VERBAL OR SYMBOLIC SOURCES WHICH REFER TO OBJECTS, MATERIALS, DEVICES, SITUATIONS, EVENTS, OR PERSONS. EXAMPLES OF INDIRECT INFORMATION INCLUDE: WRITTEN MATERIAL, ORAL REPORTS OR DESCRIPTIONS, DIAGRAMS, CHARTS, SYMBOLS, GRAPHS, TABLES OF NUMBERS, MEASURING DEVICES, TESTING EQUIPMENT, SPEECH, PICTURES, ETC.

THE INFORMATION CONTENT ITEMS FALL INTO THE FOLLOWING ELEVEN GROUPS:

MECHANICAL
ELECTRICAL
STRUCTURAL/LAYOUT
MATERIALS
ENVIRONMENT
ART/DECORATIVE
BIOLOGICAL/HEALTH
SEMANTIC/SYMBOLIC
BUSINESS/SALES
PEOPLE/ANIMALS
NUTRITION/SANITATION

AS YOU RATE THESE ITEMS, PLEASE KEEP IN MIND THE DISTINCTION BETWEEN DIRECT AND INDIRECT INFORMATION.

MECHANICAL INFORMATION

For each of the following items, indicate the significance to the job of information pertaining to mechanical devices. A mechanical device consists of an assemblage of parts which operate according to principles of gears, linkages, connections and fittings, leverage, screws, hydraulics, aerodynamics, balance, friction, and vibration. Mechanical devices may be man-powered, fuel-powered, electrically powered, steam or hydraulically powered, or powered by natural forces such as water or wind. Examples of mechanical devices include: vehicles, card sorters, cranes, vending machines, drill presses, heating-air conditioning systems, chain saws, sewing machines, and cameras.

1A. (S)_____ Direct Mechanical Information: Direct sensory information pertaining to such aspects of mechanical devices as state of mechanical functioning, malfunctioning of specific parts, state of maintenance, interrelations of mechanical parts, mechanical feedback, motion of mechanical parts, and quality and quantity of machine output. Examples of activities involving direct mechanical information include: determining whether an auto engine is functioning properly, a radiator cap is losing pressure, a machine is well oiled, a part in a machine is aligned, a clutch is being properly operated based on machine feedback, paper is being properly fed into a printing press, a bottling machine is filling bottles, etc. Examples of jobs in which direct mechanical information is used include: auto mechanic, aircraft mechanic, milling machine set-up operator, and stationary engineer.

2A. (S)_____ Indirect Mechanical Information: Indirect sensory information pertaining to mechanical devices from such sources as displays (oil gauge, overload light, etc.), written material pertaining to mechanical devices (repair materials, operating manuals, parts catalog, etc.), mechanical drawings (tool drawings, machine drawings, etc.), and mechanical test equipment and measuring devices (timing lights, micrometers, etc.). Examples of activities involving indirect mechanical information include: reading a tachometer, following an auto repair manual, using measurements on a drawing to make a machine part, measuring a machine part with a micrometer, etc. Examples of jobs in which indirect mechanical information is used include: tool and die maker, mechanical engineer, aerospace engineer, and auto mechanic.

ELECTRICAL AND ELECTRONIC INFORMATION

For each of the following items, indicate the significance to the job of information pertaining to electrical devices or systems. An electrical device or system is an assemblage of interconnected or interrelated parts or components operating by principles of electricity or electronics to accomplish some purpose. Examples of electrical devices or systems include: domestic wiring systems, electrical system of an electric appliance, television sets, computers, automobile electrical systems, and stereo hi-fi systems. Components of electrical systems or devices include: switches, wires, amplifiers, speakers, generators, transistors, resistors, and tubes.

3A. (S)_____ Direct Electrical Information: Direct sensory information pertaining to such aspects of electrical devices or systems as malfunctions of specific parts, interrelations and interconnections of electrical parts, overall performance of electrical devices, state of maintenance, and position of regulation and control switches and dials on electrical devices. Examples of activities involving direct electrical information include: determining whether a transistor is burned, a solid state circuit is broken, an electric heater is producing sufficient heat, battery terminals are corroded, switches are in the proper positions, etc. Examples of jobs in which direct electrical information is used include: electrician, radar serviceman, electronics subassemblies inspector, and TV repairman.

4A. (S)_____ Indirect Electrical Information: Indirect sensory information pertaining to electrical devices from such sources as symbols (capacitor color codes, electronic schematic symbols, etc.), test equipment and measuring devices (oscilloscopes, ammeters, etc.), schematics and diagrams (circuit schematics, component layout diagrams, etc.), written material pertaining to electrical devices (repair manuals, operator manuals, etc.), displays (gauges, dials, etc.), and written material pertaining to basic principles of electricity and electronics (textbooks on principles of current flow, journal articles on nuclear generation of electricity, etc.). Examples of activities involving indirect electrical information include: reading repair manuals containing electronic schematic diagrams, checking radar unit with test equipment, reading articles on electronic principles, etc. Examples of jobs in which indirect electrical information is used include: electrical engineer, appliance serviceman, TV repairman, electronics technician, and electrical substation operator.

STRUCTURAL/LAYOUT INFORMATION

For each of the following items, indicate the significance to the job of information pertaining to the interrelationships of objects or parts. This includes the arrangement of connected parts which form an object by construction or assembly (structural information) as well as the arrangement of unconnected objects within a prescribed space or area for efficient or aesthetic utilization of materials and space (layout information).

5A. (S)_____ Direct Structural Information: Direct sensory information pertaining to such aspects of constructed or assembled objects as interrelation, position, or fit of connected parts (arrangement of pieces of a carburetor, etc.), connections and fastenings of parts (whether nails are strong enough, etc.), and appearance of assembled or constructed objects (whether joints are smooth, etc.). Examples of activities involving direct structural information include: inspecting the arrangement of pieces in a dress, determining whether boxes are sufficiently well constructed, inspecting a chair to see if all four legs are of equal length, etc. Examples of jobs in which direct structural information is used include: pipe fitter, furniture designer, welder, carpenter, and tailor.

6A. (S)_____ Direct Layout Information: Direct sensory information pertaining to such aspects of unconnected objects as proper arrangement (dress patterns laid out on material to minimize waste), efficient utilization of space (machinery arranged in shops to increase production), and aesthetic arrangement of objects (plants attractively located in yard). Examples of activities involving direct layout information include: cutting sheet metal to construct a duct, loading a moving van, arranging flowers, etc. Examples of jobs in which direct layout information is used include: landscape gardener, punch press operator, advertising layout man, and sheet metal worker.

7A. (S)_____ Indirect Structural Information: Indirect sensory information pertaining to constructed or assembled objects from such sources as drawings (house plans, machine drawings, etc.), measuring devices (rulers, dividers, etc.), written material pertaining to constructed or assembled objects (building codes, assembly instructions, etc.), and written material pertaining to the basic principles of structures (principles of stress, properties

of various types of beams, etc.). Examples of activities involving indirect structural information include: reading blueprints of a house or motor, measuring the level of a brick wall with a bubble level, reading an installation manual for an air conditioning system, reading a journal article on thermal expansion of concrete highways, etc. Examples of jobs in which indirect structural information is used include: sheet metal worker, plumber, fabrication inspector, and welder.

8A. (S)____ Indirect Layout Information: Indirect sensory information pertaining to unconnected objects from such sources as drawings (sketch of furniture placement, etc.) and written materials on layout (books on landscape architecture, etc.). Examples of activities involving indirect layout information include: estimating cost of landscaping job from a drawing, placing machinery in a factory following a space utilization floor plan, painting a billboard following a small sketch, etc. Examples of jobs in which indirect layout information is used include: sheet metal worker, cloth cutter, landscape gardener, millwright, and printer.

MATERIALS INFORMATION

For each of the following items, indicate the significance to the job of information pertaining to the quality, physical characteristics, or chemical characteristics of materials that will be attended to by the incumbent. Qualities of materials include: clarity, homogeneity of color or texture, aroma, taste, etc. Physical characteristics include: density, mass, state, viscosity, optical density, color, malleability, etc. Chemical characteristics include: ability of materials to form chemical bonds with other materials, physical conditions under which bonding occurs, and catalysts used in bonding.

9A. (S)____ Direct Physical Information: Direct sensory information pertaining to such aspects of materials as surface characteristics (color, texture, etc.), consistency (homogeneity of particle size, viscosity, etc.), overall quality (clarity, aroma, smoothness, etc.), strength (hardness, shear strength, etc.), and ability to be formed (malleability, ductility, etc.). Examples of activities involving direct physical information include: examining an uncut diamond for clarity and brilliance, smelling the aroma of bread being baked, examining mortar for proper consistency, pulling on a dress seam to determine its strength, hammering gold into jewelry, etc. Examples of jobs in which direct quality and physical characteristic information is used include: gemologist, metallurgical technician, solid propellant processor, blacksmith, welder, welding inspector, and baker.

10A. (S)____ Direct Chemical Information: Direct sensory information pertaining to such aspects of materials as chemical reactivity (effect of acid on materials, effectiveness of cleaning solution, etc.), chemical hazards (causticity, flammability, etc.), and physical conditions of reactants (melting of ores, temperature of dyes, etc.). Examples of activities involving direct chemical information include: observing the etching of metal by acid, smelling the presence of flammable solvents, watching solids precipitate during chemical reaction, etc. Examples of jobs in which direct chemical information is used include: bio-instrumentation technician, pilot-control operator, inhalation therapist, metallurgical technician, and wood pulp bleacher.

11A. (S)____ Indirect Materials Information: Indirect sensory information pertaining to materials from such sources as symbols (chemical symbols, building material symbols, etc.), nontechnical written material (storage

instructions for materials, written warnings on packages, etc.), technical written material (chemistry textbooks, beam specifications, property of alloys in a handbook, etc.), and measuring and testing devices (thermometers, hardness testers, etc.). Examples of activities involving indirect materials information include: reading chemical symbols to determine contents of containers, reading storage instructions for building materials, reading an organic chemistry textbook, prospecting for uranium using a geiger counter, etc. Examples of jobs in which indirect materials information is used include: physicist, chemist, chemical operator, and metallurgical technician.

ENVIRONMENT INFORMATION

For each of the following items, indicate the significance to the job of information related to objects, materials, and conditions of the outdoor environment. Included is information pertaining to the soil, air, water, weather, and environmental emergencies such as forest fires, floods, and storms.

12A. (S)_____ Direct Environmental Information: Direct sensory information pertaining to such aspects of the environment as soil (soil types, erosion, etc.), plant life (crop conditions, plant parasites, fertilizers, etc.), environmental emergencies (floods, forest fires, etc.), water conditions (lakes, municipal water supplies, etc.), terrain and geological features (presence of minerals, degree of erosion, etc.), and weather and atmospheric conditions (cloud formations, amount of precipitation, air pollution, etc.). Examples of activities involving direct environmental information include: observing the effects of soil erosion at a construction site, examining a forest for plant parasites, checking for pollution in a city water supply, predicting flooding after heavy rains, etc. Examples of jobs in which direct environmental information is used include: farmer, forester aide, hydrologist, logging manager, and rancher.

13A. (S)_____ Indirect Environmental Information: Indirect sensory information pertaining to the environment from such sources as tables and graphs (records of daily temperature, tables of soil characteristics, etc.), charts and maps (meteorological charts, aerial photographs, etc.), environmental test equipment (sonar, barometer, surveying instruments, etc.), and written materials pertaining to the environment (soil science journals, environmental impact statements, etc.). Examples of activities involving indirect environmental information include: reading weather charts, reading a manual to determine chemicals needed based on a soil test, measuring ocean temperatures at various depths, etc. Examples of jobs in which indirect environmental information is used include: forester, meteorologist, farmer, and aerial photograph interpreter.

ART/DECORATIVE INFORMATION

For each of the following items indicate the significance to the job of information pertaining to the aesthetic arrangement and treatment of objects and effects. Included is information from art objects, interior decorations, handicrafts, music, drama, dance, and other objects and events designed for aesthetic purposes. This category includes those things which might be considered to reflect aesthetic sensitivity.

14A. (S)_____ Direct Art/Decorative Information: Direct sensory information pertaining to such aspects of objects and effects as color and color schemes (arrangement of contrasting and complementing colors, pleasing color, etc.), form and shape of objects (design of furniture, shape of sculpture, etc.), location of objects or people (arrangement of furniture, location of actors on stage, etc.), music (tune, harmony, etc.), and expressive behavior (movements of dancer, facial expression of actor, etc.). Examples of activities involving direct art/decorative information include: judging an art exhibit, decorating an office, directing a musical, etc.). Examples of jobs in which direct art/decorative information is used include: art teacher, furniture designer, stage director, retail store manager, artist, illustrator, silver saleslady, and orchestra conductor.

15A. (S)_____ Indirect Art/Decorative Information: Indirect sensory information pertaining to art/decorative objects and effects from such sources as representations (sketches, models, photographs, etc.), musical notation, and written material (drama script, review of concert, etc.). Examples of activities involving indirect art/decorative information include: building a stage following sketches, writing the history of an opera, etc. Examples of jobs in which indirect art/decorative information is used include: stage carpenter, wardrobe seamstress, and motion picture director.

HEALTH INFORMATION

For each of the following items, indicate the significance to the job of information related to health or nutrition, including the functioning of life systems, anatomy and physiology, diet, food science, hygiene and sanitation, and first aid and medical practices.

16A. (S)_____ Direct Health Information: Direct sensory information pertaining to such aspects of living beings as state of health/hygiene (broken bones, body cleanliness, etc.) and signs of dietary need (skin eruptions, excess body weight, etc.) or information from such objects as materials related to health (casts, glass slides, gauze, microscope, etc.) and nutrition/sanitation (foods, milk pasteurizers, cleaning solutions, kitchen utensils, etc.). Examples of activities involving direct health information include: feeling a pulse, looking for contamination in a kitchen, counting white blood cells, etc. Examples of jobs in which health information is used include: physician, sanitarian, veterinarian, nurse, dietitian, and kitchen helper.

17A. (S)_____ Indirect Health Information: Indirect sensory information pertaining to living beings from such sources as pictures and diagrams (X-rays, photographs, anatomy charts, etc.), measuring and testing devices (thermometer, blood pressure gauge, etc.), verbal information about symptoms, and written information (patients' history, medical journal article, nutritional manual, etc.). Examples of activities involving health information include: reading X-rays, reading electroencephalograms, interviewing patients, reading journal articles, etc. Examples of jobs in which indirect health information is used include: physician, medical technologist, sanitarian, and nurse.

INFORMATION FROM SEMANTIC/SYMBOLIC MATERIALS

For each of the following items, indicate the significance to the job of information from words, numbers, and other symbols which the incumbent receives as written or oral/auditory input. The incumbent may work with the content or measuring of the data, its adherence to symbolic and semantic rules and conventions, its format, or its accuracy.

18A. (S)_____ Information from Graphic and Tabular Materials: Information from materials in graphic form such as tax tables, log tables, balance sheets, diagrams, maps, flow charts, mechanical drawings, etc. Examples of activities involving information from graphic materials include: calculating taxes using tax tables, solving mathematical problems using special tables, planning the location of a shopping center driveway using maps, etc. Examples of jobs in which graphic materials are used include: accountant, civil engineer, meteorologist, and chemical plant operator.

19A. (S)_____ Clerical Information: Information from semantic and symbolic materials in written or oral form to be used in such activities as checking the spelling, punctuation, and format of a letter, the correspondence of two lists, the grammar of a letter, the filing of letters based on their content, etc. Examples of jobs in which information from clerical activities on written materials is used include: secretary, office clerk, typist, telephone operator, and printer.

20A. (S)_____ Written Technical Information: Indirect information pertaining to technical areas from such sources as written material on principles of mechanics, structure, electricity, chemicals, materials, and mechanical drawings and test equipment, textbooks on aerodynamics, journal articles on stress in bridge beams, lab reports on electronic equipment, chemical handbooks, operation manuals, repair manuals, blueprints, timing lights, micrometers, etc. Examples of activities involving written technical information include: designing an automobile, planning the assembly of refrigerators, improving the electrical system in a machine shop, etc. Examples of jobs in which written technical information is used include: precision assembly mechanic, tool designer, cost analysis engineer, and metallurgical technologist.

21A. (*)_____ Difficulty of Written Material: The difficulty of the content of written/verbal materials used in the job. Use the following special scale for this item.

0 - No or negligible written/verbal information

1 - Very easy (comic books, etc.)

2

3 - Easy (pulp fiction, etc.)

4

5 - Standard (news magazines, etc.)

6

7 - Difficult (college history textbook, etc.)

8

9 - Very difficult (scientific journals, law books, etc.)

22A. (*)_____ Difficulty of Numerical Information: The difficulty of type of numbers and/or signs and symbols found in written symbolic information used in the job. Use the following special scale for this item.

0 - Negligible information from numbers present.

1 - Presence of natural or counting numbers (1, 2, 3, etc.) and/or addition and subtraction signs (+, -).

2

3 - Presence of positive and negative numbers (-2, -1, 0, +1, +2, etc.) and/or the use of multiplication, division, and equal signs.

4

5 - Presence of positive and negative fractions and decimals (-3/4, -.25, 0.0, +1.1, +1 7/8, etc.) and/or exponentials, square roots, and inequality signs (2^3, $\sqrt{\ }$, <, >, etc.).

6

7 - Presence of irrational numbers ($\sqrt{2}$, π, $-\sqrt{7}$, etc.) and/or logarithm of numbers, trig functions, union, etc. (log, cos, tan, U, etc.).

8

9 - Presence of imaginary and complex numbers ($\sqrt{-1}$, $4\sqrt{-1}$, $\sqrt{-6}$, etc.) and/or integration of differentiation signs ($\int$ and dy/dx).

BUSINESS/SALES INFORMATION

For each of the following items, indicate the significance to the job of information pertaining to marketing of goods and services, business finances, business information systems, and business contacts with people. Included is information pertaining to money, merchandise, advertising, purchasing, inventory records, sales records, balance sheets, accounts ledgers, market conditions, customer satisfaction, and legal procedures.

23A. (S)____ Direct Sales Information: Direct sensory information pertaining to such sources of business information as merchandise, money, checks, customers, clients, and advertising material. Examples of activities involving direct sales information include: receiving and recording money, stocking shelves, determining clients' intentions, placing advertising materials, etc. Examples of jobs in which direct sales information is used include: sales clerk, cashier, groceryman, salesman, and bank teller.

24A. (S)____ Indirect Sales Information: Indirect sensory information pertaining to such sources of business information as business graphs and charts (earnings charts, graphs of projected earnings, etc.), legal papers (insurance contracts, sales contracts, deeds, etc.), and numerical business information (balance sheets, inventory records, etc.). Examples of activities involving indirect sales information include: planning sales campaigns based on business charts and records, installing new written sales policies, and reading sales contracts. Examples of jobs in which indirect sales information is used include: sales manager, material scheduler, administrative assistant, corporation lawyer, and salesman.

INFORMATION ABOUT PEOPLE AND ANIMALS

For each of the following items, indicate the significance to the job of information pertaining to people or animals. This may be information regarding appearance, style or grooming, motor performance, intentions, knowledge, opinions, desires, traits, habits, and other characteristics.

25A. (S)____ Direct Information Pertaining to People and Animals: Direct sensory information pertaining to people and animals such as verbal performance (student or politician answering questions, mugging victim describing thief, etc.), affective behavior (moods, feelings, attitudes, desires, etc.), physical performance (trainee's ability to use a machine, dancer's ability to do prescribed step, etc.), grooming and poise, and physical condition of people (muscle tone, figure or physique, etc.). Examples of activities involving direct information pertaining to people and animals include: teacher evaluating student knowledge, policeman getting a description from mugging victim, instructor evaluating a pilot's landing, physical education instructor adjusting exercises for new students, hairstylist fashioning a client's hair, etc. Examples of jobs in which direct information pertaining to people and animals is used include: salesman, barber, policeman, teacher, and dog trainer.

26A. (S)____ Indirect Information Pertaining to People and Animals: Indirect sensory information pertaining to people and animals from such sources as descriptions of individual work experience, credit records, test scores, graphic information about people (tables of test scores, graphs of relation between income and age, etc.), and characteristics of groups of people (buying habits, voting behavior, etc.). Examples of activities involving indirect information about people and animals include: evaluating a loan applicant's credit record, using a life expectancy table to calculate insurance premiums, planning a political campaign using precinct voting records, etc. Examples of jobs in which indirect information pertaining to people and animals is used include: personnel manager, psychiatrist, sociologist, and police detective.

NUTRITION/SANITATION INFORMATION

For each of the following items, indicate the significance to the job of information pertaining to materials, objects, and devices related to nutrition, sanitation, and food preparation and information pertaining to food preferences.

27A. (S)_____ Direct Nutrition/Sanitation Information: Direct sensory information pertaining to such aspects of foods as the materials, objects, and devices related to nutrition, sanitation, or food preparation (milk pasteurization equipment, chemicals to retard spoilage, cleaning materials, food packaging equipment and materials, kitchen utensils, etc.). Examples of activities involving direct nutrition/sanitation information include: reading thermometers on pasteurization equipment, inspecting cleanliness of kitchens, examining soft drink bottles prior to filling, etc. Examples of jobs in which direct information about nutrition/sanitation is used include: short order cook, dietitian, dairy processing equipment operator, and baker.

28A. (S)_____ Indirect Information About Food Preferences: Indirect sensory information pertaining to food preferences of groups of people. Examples of activities involving indirect information about food preferences include: reading trade journal articles on successful menus for different types of restaurants or parts of the country, using market surveys to plan the distribution of new meat products, etc. Examples of jobs in which information about food preferences is used include: cafeteria manager, dietitian, and supermarket manager.

SENSORY CHANNEL

THIS SUBCATEGORY CONTAINS ITEMS DEALING WITH THE VARIOUS SENSORY MECHANISMS THROUGH WHICH INFORMATION IS RECEIVED.

SENSING

For each of the following items, indicate the significance to the job of information received through the various sense modalities.

29A. (S)_____ Near Acuity: The ability to visually discriminate detail at normal reading distance or less (typist, jeweler, machinist, etc.).

30A. (S)_____ Far Acuity: The ability to visually discriminate detail beyond normal reading distance (bus driver, fire lookout, umpire, land surveyor, etc.).

31A. (S)_____ Depth Perception: The ability to perceive distances, such as: from the observer to an object, between objects along the observer's line of vision, from the front to the back of an object so that it is seen three-dimensionally, etc. (aircraft pilot, commercial photographer, crane operator, etc.).

32A. (S)_____ Color Vision: The ability to identify and distinguish color (medical lab technician, interior decorator, television repairman, color-printing press operator, painter, etc.).

33A. (*)_____ Auditory Acuity: The ability to detect and discriminate between sounds in terms of their intensity, pitch, or tonal quality. Indicate the level of auditory acuity required in the performance of this job.

0 - None: May be adequately performed by a deaf person (produce packer, dishwasher, newspaper carrier, etc.)

1 - Very low (mail carrier, chain saw operator, draftsman, etc.)

2

3 - Low (truck driver, television repairman, beautician, etc.)

4

5 - Average (bank teller, sales clerk, highway patrolman, etc.)

6

7 - High (telephone operator, physician, radio dispatcher, etc.)

8

9 - Very high (sonar operator, piano tuner, violinist, etc.)

34A. (*)_____ Kinesthesis: Indicate the degree to which the incumbent must sense movement or changes in position of his body or body parts solely from "the feel of it"; that is, by relying solely on the muscular, tendon, and joint senses.

0 - Kinesthetic discrimination is not required (interviewer, lobbyist, insurance salesman, etc.)

1 - Very small (disc jockey, librarian, bookkeeper, etc.)

2

3 - Small (machinist, mail sorter, waiter, etc.)

4

5 - Moderate (plumber, carpenter, auto mechanic, etc.)

6

7 - Great (key punch operator, trombone player, golfer, etc.)

8

9 - Very great (piano player, ballet dancer, juggler, etc.)

35A. (*)_____ Equilibrium: Indicate the degree to which the incumbent must attend to body balance or orientation to the upright.

0 - To a negligible extent (typist, office clerk, etc.)

1 - To a very small extent (barber, photographer, bartender, etc.)

2

3 - To a limited extent (waitress, surveyor, porter, etc.)

4

5 - To a moderate extent (house carpenter, railway switch-yard worker, etc.)

6

7 - To a considerable extent (roofing worker, lineman, etc.)

8

9 - To a very great extent (ballet dancer, aerialist, steel worker walking steel beams, etc.)

36A. (*)_____ Tactual Discrimination: Indicate the level at which the incumbent must identify and/or judge the characteristics of objects with the sense of touch.

0 - Tactual discrimination is not required (insurance salesman, watchman, elementary school teacher, etc.)

1 - Very easy (draftsman, mailman, patrolman, etc.)

2

3 - Easy (practical nurse, house painter, produce packer, etc.)

4

5 - Moderate (dressmaker, carpenter, upholsterer, etc.)

6

7 - Difficult (auto body repairman, auto mechanic, sculptor, etc.)

8

9 - Very difficult (surgeon, tobacco grower, cloth examiner--hand, etc.)

37A. (*)_____ Taste Discrimination: Indicate whether the incumbent is required to identify and/or discriminate between various tastes.

0 - Does not differentiate between tastes in performance of the job.

1 - Employs taste identification and/or discrimination in performance of the job (baker, narcotics investigator, wine steward, cook, bartender, chemist, etc.)

38A. (*)_____ Odor Discrimination: Indicate whether the incumbent is required to identify and/or discriminate between various odors.

0 - Does not differentiate between orders in performance of the job.

1 - Employs odor identification and/or discrimination in performance of the job (meat clerk, chef, gas-meter installer, perfumer, etc.).

B. MENTAL ACTIVITIES

THIS CATEGORY OF ITEMS DEALS WITH THE MENTAL (INFORMATION-PROCESSING) ACTIVITIES REQUIRED OF THE WORKER. IT IS DIVIDED INTO FIVE ITEM GROUPS: FIGURAL INFORMATION PROCESSING, SYMBOLIC INFORMATION PROCESSING, SEMANTIC INFORMATION PROCESSING, BEHAVIORAL INFORMATION PROCESSING, AND EDUCATIONAL AND EXPERIENTIAL REQUIREMENTS.

FIGURAL INFORMATION PROCESSING

Mental activities involving the processing of information pertaining to things (for example: machines, structures, various objects being acted upon, object parts, people and animals as objects, figures and drawings, etc.).

Figural Comprehension: Recognizing, comprehending, or understanding information from objects and object systems, or from graphic and pictorial representations of objects and object systems.

1B. (S)_____ Closure: Visually recognizing or identifying objects and figures which are in a complex and distracting field or are incomplete, vague, partially obscured, seen only at a glance, etc. Tests measuring this mental process often require the examinee to discover a picture or geometric pattern embedded in a complex pattern or quickly identify drawings of objects with parts missing. Examples of activities requiring closure are: aerial photograph interpreter examining a photograph for a camouflaged military installation, laboratory technician identifying types of cells under a microscope, identification of types of ships or airplanes at a distance (assuming normal visual acuity), identification from the air of a terrain feature which is partially obscured by clouds, etc.

2B. (S)_____ Spatial Orientation: Visually perceiving the arrangement of objects in three-dimensional space using one's own body as a frame of reference; maintaining orientation in relation to objects in space. Examples of activities requiring spatial orientation are: an airplane pilot making a visual landing, a crane operator moving a concrete slab from a truck bed to the sixth floor of a building under construction, a guide climbing a mountain, a quarterback perceiving the arrangement of players on the field while a play is in progress, a construction foreman perceiving the arrangement of beams and uprights while supervising the framing of a house, etc.

3B. (S)_____ Object Visualization: Mentally visualizing and mentally manipulating (or transforming) objects, figures, and object or figure arrangements, in space. Object visualization differs from spatial orientation (Item 2B) in that in object visualization the observer is removed from the spatial pattern, whereas in spatial orientation

he is the center of the pattern. A test measuring this mental process might present the examinee with a sketch of a solid form, along with diagrams of several unfolded sheets of various shapes; the examinee would be required to select from the several diagrams of unfolded sheets the one which could be folded into the prescribed form. Examples of activities requiring object visualization are: a dentist using a mirror to fill a tooth, a mechanic figuring out which direction a particular gear will turn if another gear in the same mechanical system turns in a clockwise direction, an architect sketching a proposed building, an artist painting a landscape, a sheet metal worker fabricating a ventilator from a set of blueprints, a surgeon visualizing what an anatomical arrangement will look like after he has removed part of an organ, etc.

Figural Ingenuity

4B. (S)_____ Figural Ingenuity: Creative, innovative, resourceful, or flexible thinking pertaining to objects, figures, and object or figure systems; creative use of information from objects, figures, or shapes. Figural ingenuity usually occurs in situations where the range of possible solutions is rather broad, where the criteria for success are not sharply defined, and where variety or novelty of solutions is important. Figural ingenuity might involve the creation of new shapes, forms, or patterns, new ways of arranging objects, new or modified forms of object interactions or systems, etc. Tests which measure this mental process usually stress variety, originality, and quantity of solutions, and the readiness to change one's direction of thinking. Examples of activities involving figural ingenuity are: an artist or a sculptor producing an original piece of art, an architect designing an unusual building, a mechanical engineer designing a new mechanical device or making improvisations in an existing mechanical device or system, a choreographer devising an elaborate dance routine, a professional football coach sketching a new play, a package designer designing package exteriors for retail products, etc.

Figural Evaluation: Judgment or evaluation of objects and figures; judging objects and figures against standards.

5B. (S)_____ Form Perception: Visually finding or identifying pertinent detail in objects or in pictorial or graphic materials; making fine comparisons and discriminations among characteristics such as shapes, shadings, line widths, and other details in objects or figures. Speed

is an important factor in form perception; tests measuring this mental process often require the examinee to compare and match detailed geometrical figures or pictures under speed conditions. Examples of activities requiring form perception are: a fingerprint classifier comparing fingerprints, an aerial photograph interpreter examining aerial photographs, a topographical draftsman distinguishing terrain features on maps, a gemologist examining a diamond for flaws, a physician examining an X-ray to determine if a bone is fractured, a garment inspector checking articles for fabric flaws, etc.

6B. (S)_____ Aesthetic Judgment: Making visual judgments and evaluations of art and other aesthetic objects on the basis of variations in unity, proportion, form, color, arrangement or interrelationships, etc. Examples of activities requiring aesthetic judgment are: an art teacher evaluating a student's work, an art appraiser determining the value of a painting, an artist painting a picture, a sculptor carving a design in stone, an architect judging the aesthetic quality of a building design, a dress designer judging the aesthetic appeal of a garment, an interior decorator deciding on the appropriate decor for a room, an advertising lay-out man arranging drawings and photographs for advertising layouts in newspapers and magazines, etc.

SYMBOLIC INFORMATION PROCESSING

Mental activities involving the processing of information from symbols, signs, or codes--such as numbers, letters, musical notations, mathematical symbols, etc. Symbolic information differs from semantic (or verbal) information in that symbols typically have no "meaning" in and of themselves (they are signs that can be used to stand for something else), whereas words (semantic information) are very closely attached to meanings or referents.

Symbolic Comprehension: Recognizing, comprehending, or understanding symbolic information.

7B. (S)_____ Spelling: Identifying misspelled words, distinguishing between properly spelled and misspelled words, and using letters to form properly spelled words (this is not a semantic activity, since the emphasis is on the proper arrangement of letters in words, rather than the meanings of words themselves). Examples of activities requiring spelling are: a proofreader checking typed script, a secretary checking a letter before it goes out, a stenographer typing a letter from shorthand, a technical writer preparing a report, etc.

8B. (S)_____ Symbolic Induction: Finding the rules or principles underlying specific sets of symbolic data. Tests measuring this mental process often require examinees to discover the rules by which given groups or sequences of symbols are formed. For example, given the letter sets ABC, MNO, XYZ, PQS, GHI, discovering that PQS is different from the others, since the rule for the formation of the other letter sets is alphabetical order; or, given the number series 16, 32, 8, 16, 4, 8, 2, discovering that this series was formed by the arithmetic operations x2, ÷4. Examples of activities requiring symbolic indiction include: a cryptographer breaking a coded message, an archaeologist attempting to translate writings in an ancient language, a theoretical physicist developing an explanation for observed relationships in his data, an economist forming a hypothesis based on examination of financial data, etc.

Symbolic Memory

9B. (S)_____ Symbolic Memory: Mentally storing or retaining symbolic information for relatively short periods of time. Tests measuring this mental process often require examinees to memorize lists of numbers or nonsense words, sequences of numbers, number-letter pairs, etc.; examinees are tested for recall within a few minutes after exposure to

the material. Examples of activities requiring symbolic memory include: a telephone operator remembering telephone numbers and names of people, a taxicab driver remembering dispatch addresses, an air-traffic control operator remembering aircraft call signs, a grocery store check-out cashier remembering prices of the day's specials, a basketball announcer remembering players' names and numbers, etc.

Symbolic Problem Solving: Solving problems involving symbols where only one or a very narrow range of correct solutions is possible.

10B. (S)_____ Numerical Computation: Obtaining correct solutions by applying the appropriate rules and operations to numbers, including such tasks as arithmetical computation, solving simple arithmetical and algebraic equations, etc. Tests measuring this mental process require examinees to perform basic numerical operations (+, -, x, ÷) and to solve simple arithmetical equations (such as: 4 - 5 + 6 = ?) under time restrictions. Examples of activities requiring numerical computation include: an insurance underwriter computing compound interest and premium rates, a chemist computing the answer to a mathematical equation, a bookkeeper adding and subtracting debits and credits, a draftsman computing scale representations of objects, a surveyor calculating the acreage of a farm, a stock broker computing the cost of a securities transaction, a carpet estimator computing the amount of carpet needed for a job, etc.

11B. (S)_____ Symbolic Deduction: Applying premises, rules, and operations to symbolic systems in order to arrive at correct answers or solutions (for example, solving mathematical equations, or applying rules and operations to other types of symbolic formulas). Tests measuring this mental process might include items such as the following:

IF

(o) + (*) = (#)
(¢) + (#) = ($)
(¢) + (*) = (o)
(o) + (#) = (@)

What does (¢) + (*) + (#) equal?
[answer: (@)]

Examples of activities requiring symbolic deduction include: a civil engineering technician using trigonometry to calculate stress factors, an electronics technician calculating the phase relationship between current and voltage, an architectural technician calculating the area of an elliptical arch, an aerospace engineer calculating

the lift factor for various wing configurations, an agronomist applying a statistical formula to his data, etc.

Symbolic Evaluation: Judgment or evaluation of symbolic information in terms of specified criteria or standards.

12B. (S)_____ Clerical Perception: Rapidly perceiving pertinent detail in written material (either verbal or symbolic) and rapidly performing simple discriminations or comparisons with written material where the emphasis is on symbolic arrangement rather than on the meaning of the material. Tests measuring this mental process often require the examinee to rapidly compare two lists of names and numbers and identify discrepancies between items in the two lists. For example:

7410937 -------- 7410927

James W. Cannon -------- James W. Cannon

WDNTYOR -------- WDNTYUR

Examples of activities requiring clerical perception include: a proofreader checking a proof against the original copy, a stenographer typing a letter from shorthand notes, a bookkeeping machine operator transposing information from sales slips or invoices to the machine, etc.

SEMANTIC INFORMATION PROCESSING

Mental activities involving the processing of verbal information or information to which words are commonly attached; verbal thinking.

Semantic Comprehension: Comprehending or understanding information to which words are commonly attached.

13B. (S)_____ Verbal Comprehension: Comprehending or understanding written and spoken words; also, judging whether or not words are appropriately used. This mental process is based upon the size of one's listening and reading vocabulary. Tests measuring verbal comprehension typically require the examinee to identify the meanings of words. For example, which of the following words is most similar in meaning to the word EXORBITANT: (a) refreshing, (b) jovial, (c) excessive, (d) dishonest, (e) uncouth? (Answer: c). Examples of activities requiring verbal comprehension include: an attorney reading a corporate contract, a news reporter covering a political debate, an economist listening to the presentation of a professional paper, a college instructor reading a historical article, a magazine editor reviewing an article for publication, etc.

14B. (S)_____ Problem Comprehension: Understanding the structure of problems which are stated (or expressible) in words. One test measuring this mental process requires the examinee to select the operations he would perform to solve a verbally-stated problem. For example, "A sheet of plywood 4 feet wide and 8 feet long costs $5.98. Which of the following operations would you perform in order to determine the cost per square foot: (a) divide and multiply, (d) multiply and divide, (c) multiply and subtract, (d) add and multiply, (e) add and divide?" (Answer: b). (Note that this problem is verbally stated and requires no arithmetic calculations; the crucial requirement is understanding the structure of the problem.) Another test of problem comprehension requires the examinee to figure the effective distance (distance in terms of time) of a ship from port using information about wind direction, current direction, and the effective distances to add (or subtract) when the ship is going against (or with) the wind and/or current--with emphasis directed toward understanding, or structuring, the problem rather than on computation. Examples of activities requiring problem comprehension include: a city planner considering an area traffic problem, a school principal dealing with the problem of lunch scheduling, a

biologist examining a research problem, a hospital dietitian formulating a meal-planning problem, a building contractor determining the quantity of various materials needed for a job, etc.

15B. (S)_____ Problem Detection: Recognizing or identifying practical problems and potential causes and effects, especially in verbally-described plans or situations; seeing deficiencies in or potential outcomes of proposed courses of action. For example: seeing that a road should not be paved when it would have to be torn up in the near future to install new sewer pipes; recognizing that it would be unwise to develop a high-priced housing subdivision near an industrial area because of the undesirability of the location; etc. Examples of activities requiring problem detection include: an industrial consultant investigating decreased production in a company, a high school teacher trying to anticipate the problems that would arise on a planned class trip, a sales manager reviewing plans for promoting a product, a police chief reviewing a security system for a visiting dignitary, a plant manager anticipating problems related to moving equipment into a new building, etc.

16B. (S)_____ Semantic Memory: Memory of information to which words have commonly been attached. Such information may or may not be originally received in verbal form (though it often is), but it must be of a type which can be recalled or reproduced in verbal form. Examples of activities requiring semantic memory include: a news reporter remembering ideas discussed in a personal interview with a celebrity, a supervisor remembering ideas acquired at a human-relations workshop, an attorney remembering the sequence of ideas in a legal argument he is presenting, a salesman remembering information about his products and the preferences and backgrounds of his regular customers, etc.

Semantic Problem-Solving: Solving semantic (verbally-expressed) problems where only one or a relatively narrow range of correct solutions is possible, where the standard of success is rather sharply defined.

17B. (S)_____ Deductive Reasoning: Reasoning from given premises to their necessary conclusions; reasoning that if certain conditions hold or exist, then other specified conditions must follow. Also, evaluating the validity or truth of such conclusions drawn by others. Tests measuring this mental process often require the examinee to draw the appropriate conclusion from a set of stated conditions or premises. For example, given the premises (1) "No one works on holidays," and (2) "Some people work on Sundays,"

drawing the conclusion that "Sundays are not holidays." Examples of activities requiring deductive reasoning include: a district attorney preparing an argument for a jury, a scientist deriving predictions from a set of theoretical postulates, a politician pointing to a fallacy in an argument presented by his opponent, an economist presenting the theoretical rationale for a proposed solution to inflation, etc.

18B. (S)____ Plan Ordering: Arranging, in plan form, events, operations, or details into their proper order or relationship for the purpose of accomplishing some goal. Tests measuring this mental process sometimes require the examinee to arrange a randomly-presented set of described operations or events into the order necessary to accomplish a specified goal. For example, the examinee might be asked to indicate the order for seven described steps in changing a flat tire. Examples of activities requiring plan ordering include: a building contractor preparing a schedule for various sub-contracted jobs on a house, such as roofing, plumbing, and wiring; a campaign manager planning a candidate's itenerary; an educator determining the order in which courses should be offered or taken in a new curriculum; a marketing manager arranging the steps in a promotional campaign; a chef planning the order of operations for the preparation of a steak dinner; a plant production manager planning the best order of operations for meeting a production goal; etc.

Semantic Productivity: Resourceful or flexible verbal thinking in situations where the range of possible alternatives or solutions is rather broad, where there is no one correct or best solution.

19B. (S)____ Idea Originality: Producing clever, novel, or uncommon ideas. Tests measuring this mental process might require the examinee to produce clever titles for story plots, to write punch lines for cartoons, or to list all the novel consequences he can think of which would result from some unusual event; for example, "What would be the results if the human sex drive were to suddenly disappear?" Examples of activities requiring idea originality include: an advertising manager producing a new twist for a TV commercial, a cartoonist creating a satirical cartoon, a mystery writer inventing an unusual plot for a story, a TV script writer thinking up a punch line for a joke, a marketing manager thinking of an unusual name for a new product, a psychologist devising a novel explanation for violent behavior, an architect creating a new concept in the design of future cities, etc.

20B. (S)_____ Idea Expression: Rapidly and fluently putting ideas into words in oral or written connected discourse; constructing sentences to express ideas. Idea expression differs from idea production in that idea expression does not involve coming up with ideas but, rather, facility in the verbal expression of these ideas. Tests measuring this mental process might require the examinee to write, under a time limit, a theme on a particular subject; to restate a given idea in a number of different ways; or to construct sentences under a time limit. Examples of activities requiring idea expression include: a lawyer questioning a witness, a newspaper reporter writing an article, a politician speaking in a televised debate, a business executive dictating a letter, a researcher writing a technical report or proposal under a deadline, a radio sports announcer broadcasting a football game, etc.

21B. (S)_____ Plan Elaboration: Thinking of necessary details for the development of a plan to accomplish a goal or deal with a problem. A test measuring this mental process might present the examinee with a brief outline of a plan to deal with some specified problem, and ask him to fill in all the details he thinks necessary to make the plan feasible and complete; or, the examinee might be presented with a stated problem and asked to write down all the details he thinks necessary for dealing with the problem. In both cases, the examinee would be scored on the number of relevant details listed. Examples of activities requiring plan elaboration include: an agricultural scientist thinking of the necessary details for carrying out a proposed research project, a plant manager thinking of the details involved in carrying out a planned production change, a camp director thinking of the details necessary for carrying out the operations of a six-week summer program, a college instructor thinking of the details in the preparation of a new course, a sales manager planning a promotional campaign, etc.

22B. (S)_____ Verbal Construction: Constructing sentences and paragraphs which are grammatically, structurally, and punctuationally correct; properly arranging words into phrases, sentences, and paragraphs; also, judging the grammatical and structural correctness of the verbal output of others. Examples of activities requiring verbal construction include: an advertising writer preparing an ad, a technical writer preparing a report, an editor reviewing a manuscript, a corporation president giving a press interview, a high school principal preparing a speech to the PTA, a legal secretary making grammatical and punctuational corrections in letters, etc.

BEHAVIORAL INFORMATION PROCESSING

Mental activities involving the processing of information conveyed by the expressive behaviors of other persons--such as facial expressions, body movements, postures, gestures, tones of voice, etc. Such information serves as a basis for social perception on the part of the observer.

23B. (S)_____ Person Perception: Interpreting another individual's expressive behavior; drawing inferences about his current mental state--his thoughts, feelings, mood, desires, intentions, etc. Person perception occurs during face-to-face contact with other individuals. Tests measuring this mental process require the examinee to interpret pictures of different facial expressions, body postures, and gestures. Examples of activities requiring person perception include: a clergyman counseling a parishioner, an automobile salesman sizing up a customer, a school counselor helping a student with a personal problem, a policeman questioning a suspect, a psychiatric social worker interviewing a client, a personnel manager conferring with a union official, etc.

24B. (S)_____ Group Perception: Comprehending situations in which two or more individuals, in addition to the observer, are interacting; sizing up group situations. A test measuring this mental process might require the examinee to interpret a sequence of pictures depicting scenes in a group episode. Examples of activities requiring group perception include: a psychologist conducting a sensitivity training session, a recreation leader supervising a boys' camping trip, an office manager supervising a typing pool, a social group worker directing activities at a community center, an elementary school teacher supervising a group project, a power-line foreman supervising a line crew, etc.

EDUCATIONAL AND EXPERIENTIAL REQUIREMENTS

This group of items deals with the education and work experience required by the job.

25B. (*)_____ Educational Level: Indicate the amount of formal education (public and private schools, colleges, and universities) typically required for entry into this job. Do not consider specific vocational preparation (vocational education, apprentice training, in-plant training, etc.) in this rating.

0 - Less than an 8th-grade education

1 - 8 to 12 years of education (without a high school diploma)

2 - A high school diploma

3 - 2 to 4 years of college (without a degree)

4 - A bachelor's degree (B.S., B.A., A.B., etc.)

5 - A graduate degree (M.S., M.Ed., Ph.D., D.D.S., M.D., Ed.D., L.L.D., D.V.M., etc.)

26B. (*)_____ Job-Related Preparation: Indicate the amount of specific vocational preparation (vocational and technical school, apprentice training, in-plant training, on-the-job training, etc.) required for adequate performance of the job. Do not include degree-granting programs (medical school, dental school, engineering school, etc.) or career progression (previously held jobs) in this rating.

0 - None or short demonstration only

1 - 1 to 30 days

2 - 1 to 6 months

3 - Over 6 but less than 12 months

4 - 1 to 2 years

5 - Over 2 years

27B. (*)_____ Work Experience: Indicate the amount of essential work experience (previous experience in less responsible, lower-level, or related jobs) typically required for this job. This item deals with career progression; for example, certain types of work experience might be required for selection or promotion to a managerial position.

0 - Entry-level job; no work experience required

1 - Less than 3 months

2 - 3 to 12 months

3 - 13 months to 3 years

4 - Over 3 but less than 5 years

5 - Over 5 years

C. WORK BEHAVIOR

THIS CATEGORY OF ITEMS DEALS WITH THE ACTIVITIES REQUIRED OF WORKERS BY THEIR JOBS. IT IS DIVIDED INTO THREE MAJOR SUBCATEGORIES: I. PHYSICAL WORK BEHAVIOR; II. REPRESENTATIONAL WORK BEHAVIOR; AND III. INTERPERSONAL WORK BEHAVIOR. ONE OF THESE SUBCATEGORIES WILL PROBABLY BE MORE RELEVANT THAN THE OTHERS TO THE JOB YOU ARE RATING. HOWEVER, NEARLY ALL JOBS HAVE ASPECTS WHICH RELATE TO ALL THREE SUBCATEGORIES; THEREFORE, FOR ANY JOB, EVERY ITEM IN ALL THREE SUBCATEGORIES SHOULD BE READ AND CONSIDERED.

I. PHYSICAL WORK BEHAVIOR

THE ITEMS IN THIS SUBCATEGORY DEAL WITH MANUAL WORK ACTIVITIES. THERE ARE TWO SECTIONS OF ITEMS: A. GENERAL PHYSICAL REQUIREMENTS AND WORK ACTIVITIES; AND B. OBJECTS ACTED UPON.

General Physical Requirements and Work Activities

This section deals with the physical capabilities and work activities required of the worker by his job. There are three categories of items:

General Physical Requirements

Work Activities Involving Materials, Objects, and Machines

Work Activities Involving Humans and Animals

GENERAL PHYSICAL REQUIREMENTS

Indicate the significance of each of the following physical activities or abilities in performing the job.

Coordination

1C. (S)_____ Eye-Hand Coordination: Making rapid and accurate aiming movements with the hand in coordination with visual stimuli (operating a switchboard or multiple button control panel, positioning objects rapidly as in bricklaying, sorting mail into pigeonholes, etc.).

2C. (S)_____ Control Precision: Making fine, highly controlled arm-hand or leg-foot movements in adjusting a control mechanism (operating a crane to position a steel beam for riveting, landing an airplane, etc.).

3C. (S)_____ Tracking: Intermittent or continuous adjustment to a moving target or a changing course. For example, maintaining a desired course of a vehicle or piece of equipment through space, guiding a piece of material through a machine, following a particular course with a tool through a piece of material, etc., based on visual, auditory, or tactual feedback (steering a car or flying an airplane, moving materials with a crane, cutting a pattern in a piece of wood with a jig saw, following a moving object through a telescope, etc.).

4C. (S)_____ Finger Dexterity: Skillfully manipulating small objects with the fingers (cutting ornamental designs in jewelry, assembling clocks, wiring appliances, etc.).

5C. (S)_____ Manual Dexterity: Making rapid skillful arm-hand movements in manipulating objects (changing spark plugs in a car; cutting, wrapping, and packing cheese in boxes; sewing pieces of material together using a sewing machine; etc.).

6C. (S)_____ Arm-Hand Steadiness: Arm-hand positioning of tools or objects where precision and steadiness are essential (manually welding two pieces of metal together, pouring acid into test tubes, lettering a sign on an office door, painting a picture, etc.).

7C. (S)_____ Reaction Time: Responding quickly with an action in response to a "signal" (hitting the brakes in time to avoid a child who has run into your truck's path,

responding to an aircraft engine warning light, stopping an electronic card sorter when a card jams, etc.).

8C. (S)_____ Multilimb Coordination: Coordinating the movements of a number of limbs--both hands, both feet, or hands and feet--simultaneously (playing a piano, flying a light airplane, shifting the gears of a standard truck transmission, etc.).

9C. (S)_____ Balance: Maintaining body balance in situations where equilibrium is threatened or temporarily lost (roofing a house with a hip roof, painting from a 12-foot ladder, serving meals on an airplane, walking a steel beam, etc.).

10C. (S)_____ General Body Coordination: Performing coordinated movements which involve the entire body (performing as a professional athlete, washing the windows of a skyscraper, demonstrating the use of a trampoline, policeman controlling rioters, etc.).

Movement

11C. (S)_____ Walking (making "rounds" with a doctor, patrolling a police beat on foot, etc.)

12C. (S)_____ Running (laying hose to fight a fire, operating a rescue service, etc.)

13C. (S)_____ Climbing (ascending a utility pole, painting the structural members of a bridge, etc.)

Positions

14C. (S)_____ Standing (barbering, cashiering, etc.)

15C. (S)_____ Sitting (typing a letter, driving a moving van, etc.)

16C. (S)_____ Kneeling/Stooping/Crawling (placing merchandise stock on lower shelves, changing a flat tire, inspecting under a house for termites, etc.)

17C. (S)_____ Lying (working under a car without the aid of a hoist, doing plumbing work in a low place, etc.)

Strength

18C. (S)_____ Finger/Hand/Arm Strength: Exerting force against objects with the fingers, hands, or arms (cutting sheet metal

with hand shears, loosening a rusty bolt with hand wrenches, cutting metal rods with bolt cutters, etc.).

19C. (S)_____ General Body Strength: Exerting considerable force against objects for a brief period, as in lifting, pushing, pulling, carrying, etc. (stacking 100-lb. sacks of feed, moving furniture, etc.).

20C. (S)_____ Explosive Strength: Expending a maximum of energy in one or a series of bursts (throwing a line from a ship to the shore; shoving a heavy appliance, such as a refrigerator, into place; etc.)

21C. (S)_____ Endurance/Stamina: Exerting the body through continuous effort over a prolonged period of time (running cross-country, infantry man engaging in maneuvers, digging ditches, fighting a large forest fire, etc.).

22C. (S)_____ Dynamic Strength: Exerting force repeatedly or continuously over time so as to move or support the body; requires muscular endurance and resistance to muscular fatigue (performing a dance routine; performing as a gymnast; riveting the sheet metal to an airplane wing, one rivet after another, repeatedly; etc.).

WORK ACTIVITIES INVOLVING MATERIALS, OBJECTS, AND MACHINES

This category of items contains a list of activities which characterize ways in which incumbents work with materials, objects, or machines. Consider for each item whether or not the incumbent performs the activity described. Then assign a rating on the significance of the activity to the job.

Material Parting Activities

23C. (S)_____ Cutting by Sawing: Sawing pertains to parting material using a tooth-edged blade. Activities involving cutting by sawing include: the use of circular table saws, radial arm saws, jig saws, chain saws, saber saws, hacksaws, coping saws, surgical saws, etc. Job examples which involve significant amounts of cutting by sawing include: carpenter, cabinet maker, gang sawyer, shipfitter, machinist, and butcher.

24C. (S)_____ Cutting by Blade: Cutting by blade pertains to parting material using sharp smooth-edged tools. Activities which involve cutting by blade include: the use of knives, axes, scalpels, razors, meat slicing machines, electric meat knives, rotary power mowers, etc. Job examples which involve significant amounts of cutting by blade include: meat cutter, chef, butcher, and fish cleaner.

25C. (S)_____ Cutting by Shearing: Shearing pertains to the parting of material with shearing tools. Shearing tools cut by the action of two parallel and opposite forces. Activities involving cutting by shearing include: the use of scissors, tin snips, wire cutters, power nibblers, power paper cutters, barber clippers, and electric hedge clippers. Job examples which involve significant amounts of cutting by shearing include: seamstress, tailor, upholsterer, binder, metal fabricator, and machinist.

Material Joining Activities

26C. (S)_____ Bonding/Sealing: Bonding/sealing pertains to joining materials using bonding/sealing agents such as cements, glues, and caulks. Activities which are involved in bonding/sealing include: the use of glue brushes, trowels, caulking guns, putty knives, hot glue guns, bonding presses, and vulcanizing machines. Job examples

which involve significant amounts of bonding/sealing activities include: carpenter, cabinet maker, bricklayer, shipfitter, and floor covering layer.

27C. (S)_____ Joining by Fusion: Joining by fusion pertains to uniting by melting together. Activities involving fusion include: operating an arc welder, gas welder, soldering gun, cauterizing iron, etc. Job examples which involve significant amounts of joining by fusion include: electric motor assembler, semiconductor assembler, electronics assembler, and electrician.

28C. (S)_____ Stitching/Weaving: Stitching/weaving pertains to looping in-and-out with thread, fiber, or wire; usually to join, repair or decorate materials. Activities involving stitching/weaving include: the use of sewing machines, looms, knitting machines, book binding machines, needles and thread, sutures and forceps, wire pliers, etc. Job examples which involve significant amounts of stitching/weaving include: knitting machine operator, seamstress, tailor, sewing-machine operator, weaver, binder, and hemmer.

Material Modification Activities

29C. (S)_____ Shaping (Stationary Equipment): Shaping pertains to removing portions of the material by mechanical action to produce a new surface configuration. Shaping activities using stationary equipment include: the use of threading machines, lathes, stationary metal and wooden planers, metal and wood shapers, milling machines, tool grinders, and surface grinders. Job examples which involve significant amounts of shaping with stationary equipment include: metal fabricator, shipfitter, boring mill operator, lathe operator, and machinist.

30C. (S)_____ Shaping (Portable Equipment): Shaping pertains to removing portions of the material by mechanical action to produce a new surface configuration. Shaping activities using portable equipment include: the use of chisels, planes, routers, pipe threaders, etc. Job examples which involve significant amounts of shaping using portable equipment include: carpenter, cabinet maker, and shipfitter.

31C. (S)_____ Material Forming: Material forming pertains to shaping materials through the utilization of their plastic or molten properties resulting from heat, pressure, or chemical action. Activities involving material forming include: casting, molding, rolling, extruding, bending

and forging. Job examples which involve significant amounts of material forming include: molder (foundry), compression-molding machine operator, forming machine operator, injection-molding machine operator, and diecasting machine operator.

32C. (S)_____ Heat/Pressure/Chemical Treating: Heat/pressure/chemical treating pertains to modifying materials by heat, pressure, or chemical action NOT utilizing plastic properties as in forming. Heat/pressure/chemical treating activities include: cooking and baking, drying, firing pottery, curing tobacco, incinerating, pressing shirts; bleaching fabric, tanning hides, developing film, and etching metal or glass. Job examples which involve significant heat/pressure/chemical treating activities include: treating engineer (wood preserving), pulp bleacher man, baker, plater (pen and pencil), and kiln burner (brick and tile).

33C. (S)_____ Combining/Separating Substances: Combining or separating pertains to operations of joining or parting as a step in processing materials such as chemicals and foods. Activities involving combining include: mixing or blending components of plastics, paints, dyes, paper pulp, dough for bread or pastries, cement, etc. Activities involving separating include: centrifuging, extracting, distilling, screening, sorting, and filtering. Job examples which involve significant amounts of combining/separating activities include: chemical operator III, baker, banbury-mixer operator, finish mixer (textile), extractor operator (solvent process), polymerization operator (plastic materials), and medical laboratory technologist.

34C. (S)_____ Perforating/Boring (Portable Equipment): Perforating/boring pertains to making holes in solid materials. Perforating/boring activities include the use of: hand-held power drills, dentist drills, braces and bits, augers, awls, punches, etc. Job examples which involve significant amounts of perforating/boring with portable equipment include: carpenter, shipfitter, electronics assembler, and electrician.

35C. (S)_____ Perforating/Boring (Stationary Equipment): Perforating/Boring/activities include the use of drill presses, punch presses, and mortising machines. Job examples which involve significant amounts of perforating/boring using stationary equipment include: metal fabricator I, horizontal boring-mill set-up operator (machine shop), turret-lathe operator, and machinist I.

Z

36C. (S)____ Abrading, Polishing and/or Cutting by Abrasion: Abrading pertains to reducing surface irregularities or removing material by the use of abrasives. Abrading/polishing has a primary emphasis on surface preparation. Activities involving abrading, polishing, or cutting by abrasion include: the use of sanders, polishing mitts, jewelers' saws, files, rasps, belt sanders, drum sanders, sand blasting machines, tumble finishing machines, and lapping machines. Job examples which involve significant amounts of abrading activities include: jeweler, jewelry polisher, woodwork sander, carpenter, and automobile body repairman.

37C. (S)____ Liquid Application/Coating: Liquid application/coating pertains to the application of liquid or viscous substances such as paints, adhesives, etc., to the surfaces of objects or materials. Activities involving applying or coating with liquids include: the use of paint spray guns, aerosol sprays, paint brushes, paint rollers, medicine daubers, etc. Job examples which involve applying liquid coatings include: floor rolling carpenter, painter, auto-body repairman, and printer.

38C. (S)____ Liquid Application (Stationary Equipment): Liquid application involving stationary equipment pertains to the application of liquids or viscous materials to objects, where the equipment remains stationary and the objects to be coated are conveyed to the applicators, such as in spraying chambers or dipping vats. Examples of activities involving liquid application by stationary equipment include: spraying glaze onto pottery as it is conveyed through a spraying chamber, dipping an automobile body into a vat of primer, electroplating objects, silver plating a mirror, etc. Job examples involving significant liquid application activities include: spray-machine operator (pottery and porcelain), machine silver stripper (mirror), treating engineer (wood preserving), and plater (pen and pencil).

39C. (S)____ Earth Working: Earth working pertains to digging, shoveling, or otherwise working the earth, minerals, gravel, ores, etc. Earth working activities involve the use of rakes, hoes, shovels, spades, picks, post-hole diggers, tamps, plows, tractors, etc. Job examples which involve significant amounts of earth working include: farm foreman, general farmer, forester, and groundskeeper.

Assembling/Constructing Activities

40C. (S)_____ Assembling: Assembling pertains to putting parts or components together to form higher-order components or complete objects. Assembling activities include: putting parts together to produce devices such as washing machines, radios, or automobiles; or sub-assemblages such as printer circuits, armatures, or fuel pumps. Job examples which involve significant assembling activities include: electric motor assembler, electronics assembler, power lawn mower assembler, mechanic, and electrician.

41C. (S)_____ Installing/Connecting: Installing/connecting pertains to placing and hooking-up components within a larger system. Installing/connecting activities include installing: a fuel pump on an engine, a muffler on a car, a washing machine in a home, an air conditioner system in a building, etc. Job examples involving significant amounts of installing/connecting include: factory maintenance man, precision assembly mechanic, electrical appliance serviceman, and building maintenance man.

42C. (S)_____ Construction Activities: Construction pertains to the erection of structures such as buildings or dams or the building of objects such as roads and sidewalks. Examples of construction activities include: framing a house, riveting steel beams together, laying a brick wall, pouring concrete or laying asphalt. Job examples which involve significant construction activities include: carpenter (construction), maintenance carpenter helper, bricklayer, paving machine operator, cement finisher.

Operating/Controlling Activities

43C. (S)_____ Use of Hand-Operated Controls: Control operations pertain to regulating the operation of machines or equipment. Activities involving hand-operated controls include operating a steering wheel, aircraft joystick, depth-of-cut setting on a saw or turning machine, auto or truck gear shift, etc. Job examples which involve significant use of hand-operated controls include: truck operator, routeman, power shovel operator, scraper operator, power plant operator, forklift operator, and airplane pilot.

44C. (S)_____ Use of Foot-Operated Discrete Controls: Discrete controls pertain to controls which have distinct predetermined positions. Activities involving foot-operated discrete controls include: disengaging or engaging clutches, operating motorcycle gear shifts, operating foot-activated switches such as dictaphone playback switches, etc. Job examples which involve significant use of discrete foot-operated switches include: truck operator, routeman, and stenographer.

45C. (S)_____ Use of Foot-Operated Continuous Controls: Continuous controls pertain to controls which operate along a continuum without predetermined positions. Activities involving foot-operated continuous controls include: operating aircraft rudder controls, auto accelerators, dentist drill speed controls, sewing machine speed controls, auto brakes, etc. Job examples which involve significant use of foot-operated continuous controls include: truck driver, routeman, forklift operator, airplane pilot, and sewing machine operator.

46C. (S)_____ Heavy Equipment/Vehicle Operation: Heavy equipment includes bulldozers, steam rollers, graders, trucks with capacities of several tons, forklift trucks, and cranes. Activities involving heavy equipment operation include: operating bulldozers, scrapers, road graders, cranes, paving machines, combines, tractor-trailer trucks, etc. Job examples for which heavy equipment operation is significant include: power shovel operator, bulldozer operator, logstacker operator, operating engineer (construction), and general farm hand.

47C. (S)_____ Medium/Light Mobile Equipment Operation: Medium/light equipment includes average size farm tractors, wreckers, pick-up trucks, cars, and all-terrain vehicles. Activities involving medium/light equipment operation include: operating farm tractors and mowing machines and driving cars, pick-up trucks, panel trucks, etc. Job examples for which medium/light equipment operation is significant include: general farmer, forester, groundskeeper, vegetable grower, routeman, and feeder (agriculture).

48C. (S)_____ Handling of Equipment Requiring Strength: This type of activity pertains to the operation of equipment which is generally man-powered and requires considerable general body strength in lifting, pushing, or pulling. Activities involving handling equipment requiring strength include: the use of wheelbarrows, hand trucks, winches, chains, hoists, blocks and tackles, jacks, non-powered fertilizer spreaders, vices, etc. Job examples involving significant use of handling equipment requiring strength

include: bricklayer helper, cargo agent, boilermaker, fisherman, boat mechanic, and farm equipment mechanic.

49C. (S)_____ Precision Working: Precision working pertains to working on materials with hand tools in a manner requiring close attention to detail and high levels of manual skills such as eye-hand coordination and finger dexterity. Examples of precision working activities include: repairing a watch, hand engraving an inscription, cutting a diamond, and repairing defects in electrical components. Job examples involving significant precision working include: gemologist, jeweler, electronics assembler, and dentist.

Repair and Maintenance Activities

50C. (S)_____ Machine Servicing Activities: Servicing activities pertain to routine maintenance and adjustment of machinery or equipment. Servicing activities include: cleaning and lubricating equipment such as a typewriter, changing the oil of an engine, adding air to tires, etc. Job examples which involve a significant amount of servicing activity include: factory maintenance man, packaging machine mechanic, and building maintenance man.

51C. (S)_____ Machine Repair Activities: Repair activities pertain to determining the cause of malfunctions and restoring the object or equipment to its intended state. Repair activities include: locating a defective electrical component and replacing it; locating a freon leak in a refrigeration system, repairing it, and recharging the system; adjusting a carburetor to correct engine knock and stalling; removing dents from an auto body; etc. Job examples which involve significant repair activities include: precision assembly mechanic, electrical appliance repairman, aircraft mechanic (electrical), and automobile mechanic.

Measuring/Monitoring Activities

52C. (S)_____ Measuring Activities: Measurement pertains to obtaining quantitative information related to physical characteristics of objects and materials. Activities involving measurement include measuring characteristics such as hardness, acidity, radioactivity, conductivity, temperature, length, width, weight, diameter, pressure and velocity. Job examples involving significant amounts of measurement activities include: bio-instrumentation

technician, thermodynamics engineer, metallurgical technician, utility man (flooring), fabrication inspector, and process equipment operator.

53C. (S)____ Monitoring Activities: Monitoring activities pertain to observing or checking gauges, valves, or other displays on machinery and equipment to maintain operation. Examples of monitoring activities include: operating the console of a computer, checking pressure, maintaining the temperature in a kiln or oven valves on steam engines, and observing human psychological measures such as EEG or EKG machines. Job examples involving significant monitoring activities include: chemical operator III, baker, extractor operator, and medical technologist.

WORK ACTIVITIES INVOLVING HUMANS AND ANIMALS

The items which follow are concerned with activities which involve physical action upon people and/or animals. Consider whether or not the incumbent performs the following activities. Then, using the significance scale, rate the significance of the activity to the job.

54C. (S)____ Treating/Handling Activities: Treating/handling activities pertain to the physical manipulation of people or animals for the purpose of correcting or maintaining health or controlling behavior. Examples of treating/handling activities include: rehabilitating through physical therapy, setting a broken bone, bandaging a wound, controlling a violent prisoner or patient, transferring a patient from a stretcher to a bed, searching a burglary suspect or treating/handling or exercising animals. Job examples involving significant treating/handling activities include: physical therapist, lifeguard, physician, nurse, policeman, and veterinarian.

Objects/Materials Acted Upon

This section deals with objects and materials which the incumbent acts upon. The items in this section are divided into the following categories: Agricultural Materials, Textile/Synthetic Materials, Earth/Mineral Materials, and Miscellaneous Materials. Objects/materials may be acted upon directly by hand, or through the use of tools, machinery, equipment, chemicals, etc.

OBJECTS/MATERIALS ACTED UPON

The items in this sectin describe classes of objects and materials which might be acted upon by the incumbent. Workers act upon objects or materials in various ways. In some instances, the incumbent may take action which affects certain objects or materials but which requires little in the way of knowledge or understanding of those objects or materials, per se. For example: a dock worker loading machinery is not required to know the characteristics of the machinery; a refinery worker opening and closing valves which control liquid flow does not necessarily need to know the characteristics of the liquid; a truck driver transporting yard goods or a crane operator moving steel beams needs very little knowledge of the material being acted upon. In other instances, however, incumbents take action upon objects/materials which requires appreciable knowledge of the object or material characteristics; for example, a chemist mixing two substances to form a reaction, a machinist turning a high carbon steel part, a mechanic repairing an automobile engine, a pet shop operator trimming a poodle, etc.

In rating the Objects/Materials items which follow, consider for each item whether or not the incumbent takes action which affects the objects or materials described. Then assign a rating on the significance (to the job) of any action taken which affects the objects/materials in question. In cases where the incumbent acts upon the objects/materials in a way which requires negligible knowledge or understanding of those objects/materials, per se (as described in the preceding paragraph), the job should receive a low rating on those objects/materials, even though the incumbent may deal with them frequently.

Agricultural Materials

55C. (S)____ Unprocessed Agricultural Products Acted Upon: Unprocessed agricultural products include: tobacco, berries, flowers, vegetables, trees, and livestock. Unprocessed agricultural products are acted upon by farmers preparing fields and sowing, cultivating, and harvesting various crops; by foresters performing similar functions on trees; and by farm hands feeding livestock. Examples of jobs for which action on unprocessed agricultural products is significant include: berry grower, farm foreman, farm hand, farmer in general, tobacco grower, rose grower, grass grower, vegetable grower, forester, farm hand--livestock, and forester aide.

56C. (S)____ Food Materials, Non-Processed or Processed, Requiring Further Preparation, Acted Upon: Food materials requiring further processing include: sides of beef, barrels of fish, bulk milk, cheese, cuts of meat, fresh fruits and vegetables, flour, oil, sugar, frozen foods, etc. Actions upon food materials requiring further preparation include: a butcher preparing cuts of meat, a poultry man collecting eggs, a chef preparing foods, a kitchen worker washing fruit and vegetables, etc. Job examples for which action on food materials requiring further preparation is significant include: meat cutter, butcher, egg-breaking machine operator, dairy farm hand, chef, dairy processing equipment operator, and meat grinder.

57C. (S)____ Processed Wood, Cured Lumber, Wooden Parts Acted Upon: Processed wood, lumber, and wooden parts include: furniture, wooden containers, finished lumber, plywood, chipboard, prefabricated construction components of wood and wood parts such as toy parts. Processed wood, lumber, and wooden parts are acted upon by carpenters constructing homes, bookcases, molding, etc. from lumber; furniture upholsterers padding and covering wood frame furniture; woodworkers assembling or sanding wooden objects; etc. Examples of jobs for which action on processed wood, lumber, or wooden parts is significant include: carpenter, cabinetmaker, hand sander, furniture sander, and wood toy assembler.

58C. (S)____ Logs, Chips, and Uncured Lumber Acted Upon: Logs and uncured lumber include: hardwood logs, pulp logs, fuel wood, uncured lumber, pulp wood chips, etc. Actions upon logs and uncured lumber include: a lumberjack felling trees, a sawyer cutting lumber, a sawmill worker stacking logs, a pulp and paper worker digesting wood chips, etc. Job examples for which actions on logs and uncured lumber are significant include: gang sawyer (sawmill), cut-off sawyer (paper and pulp), log stacker operator (sawmill), pulp bleacher man (paper and pulp), and wood treater (wood preservation).

Textile/Synthetic Materials

59C. (S)____ Textiles, Leather, and Synthetic Materials Acted Upon: Textiles, leather, and synthetic materials include: bolts of cloth (cotton, silk, nylon, and dacron), spools of thread, yarns, leather, furs, canvas, upholstering materials, and carpeting. Actions upon textiles and leathers include: a sewing machine operator sewing cloth, a leather worker joining leather or furs, a furniture upholsterer covering furniture, etc.

Examples of jobs for which action on textiles, leather, and synthetic materials is significant include: sewing machine operator, furniture upholsterer, flatwork finisher (laundry), glue spreading machine operator (leather products), edge shaper (boot and shoe), knitting machine operator, and carpet layer.

60C. (S)____ Rubber, Plastic, Synthetic, or Paperboard Materials: Rubber, plastic, and related materials include: sheet rubber, latex, plastic, and corrugated or pressed paperboard. Rubber, plastics, and related materials may be acted upon by a machine operator manufacturing plastic objects, a flexographic pressman printing a design and information on sheets of plastic or paperboard to be made into containers, or a molding machine operator making tires or bushings from rubber. Examples of jobs for which action on rubber, plastic, and related materials is significant include: injection-molding-machine operator (plastic fabric. prod.) and flexographic pressman I.

Earth/Mineral Materials

61C. (S)____ Earth/Mineral Materials Requiring Further Processing: Earth/mineral materials requiring further processing include: bricks, tiles, glass, concrete, cut stones, sand, gravel, clay, and raw ores. Actions upon earth/mineral materials include: a jeweler cutting and setting stones, a potter forming clay to make ceramics, a bricklayer setting bricks in mortar, a bricklayer helper mixing sand and cement to make mortar, etc. Examples of jobs for which action on earth/mineral materials requiring further processing is significant include: blocker (glass mfg.), stone setter (jewelry), bricklayer helper, ram press operator (pottery and porcelain), ice maker, and kiln burner (brick and tile).

62C. (S)____ Non-Precious Metals and Non-Precious Metal Components Requiring Further Processing: Non-precious metals and metal components include sheet metal, ingots, pigs, plates, rods, bars, pipes, beams, etc. of iron, steel, copper, lead, etc. Actions upon non-precious metals and metal components include: a welder joining metal parts, a punch press operator punching holes in sheet metal, a pipe fitter cutting threads into pipes, and a machinist lathing metal stock. Examples of jobs for which processing action of non-precious metals is significant include: arc welder, induction machine operator (heat treatment), punch press operator, shipfitter, spar mechanic, extrusion saw operator (structural and ornamental metalwork), and metallurgical technician.

Miscellaneous Materials

63C. (S)____ Electrical/Electronic/Mechanical Equipment, Parts, Components Acted Upon: Equipment, parts, and components include: TV sets, computers, telephone switchboards, transistors, rheostats, wires, switches, motors, gears, bearings, crankshafts, etc. Electrical/electronic/mechanical equipment or parts are acted upon by assemblers assembling electronic or mechanical devices, maintenance men repairing electrical or mechanical devices, and stockmen maintaining and dispensing supplies of mechanical or electrical parts. Examples of jobs for which action on electrical/electronic/mechanical equipment or parts is significant include: material scheduler (aircraft mfg.), factory or mill maintenance man helper, electronic assembler, outboard motor assembler, power lawn mower assembler, bio-instrumentation technician, and boat mechanic.

64C. (S)____ Medical Materials and Patients Acted Upon: Medical materials and patients include: gauze, sutures, dental metals, dressings, plasters, and dental or medical patients. Medical materials and patients are acted upon by a dentist filling teeth, an osteopath setting a bone and forming a cast, a radiologist X-raying a patient, and a psychiatrist interviewing a patient. Examples of jobs for which action on medical materials and patients is significant include: dentist, osteopath, psychiatrist, medical technologist, bio-instrumentation technician, physical therapist, radiologic technologist, and veterinarian.

65C. (S)____ Surfaces of Buildings, Streets, Passageways, and Other Structures Acted Upon: Surfaces of structures include the interiors and exteriors of buildings, and the surfaces of bridges, streets, etc. Surfaces of structures are acted upon by janitors when cleaning floors and walls, by window washers when cleaning glazed surfaces, by painters when painting walls or structures such as bridges or storage tanks, and by street maintenance men when sweeping or maintaining streets. Job examples for which action on structured surfaces is significant include: porter I, painter, painter maintenance man, maintenance carpenter, maintenance carpenter helper, and sandblaster.

II. REPRESENTATIONAL WORK BEHAVIOR

This subcategory of items is concerned with semantic and symbolic activities. It is divided into the following categories: Representational Devices, Verbal Communications, and Symbolic and Numerical Communications.

REPRESENTATIONAL DEVICES

Representational devices are used to present, display, or process information. Consider whether the worker uses devices of that type; then, using the significance scale, indicate the significance of that device to the job.

66C. (S)____ Office Equipment: Office equipment pertains to the use of various office equipment for presenting, displaying, or processing information. Office representational devices include: typewriters, mimeographs, photocopiers, offset duplicators, spirit duplicators, microfilm printers, teletypes, keypunches, accounts posting machines, telephones and dictaphones. Jobs for which these activities are relevant include: stenographer, general office clerk, proof-machine operator, and bank teller.

67C. (S)____ Audio-Visual Equipment: Audio-visual equipment pertains to the use of audio-visual transmission and storage devices, such as: motion picture cameras and projectors, TV cameras and receivers, and video tape recorder/players. Activities involving significant use of audio-visual equipment include: Projecting movies or slides, teaching or reporting by TV, maintaining a security surveillance by TV, etc. Job examples for which these activities are relevant include: motion picture projectionist, TV cameraman, TV news commentator, school teacher, and photographer.

VERBAL COMMUNICATIONS

Consider the usual writing and speaking activities required of the worker. Then, using the significance scale, indicate the significance of the activity to the job.

68C. (S)_____ Complex Oral Communication: Complex oral communication pertains to difficult spoken verbal communication. These communications can be complex in terms of ideas communicated, personalness of communications, or formality and precision required in communicating. Activities involving complex oral communication include: interviewing, counseling, teaching, discussing, reporting, etc. Job examples for which these activities are relevant include: occupational therapist, clergyman, psychiatrist, and lecturer.

69C. (S)_____ Complex Written Communication: Complex written communication pertains to difficult written verbal communication. These communications can be complex in terms of the difficulty, formality, and precision of the material communicated. Activities involving complex written communication include: newspaper reporting, textbook writing, etc. Job examples for which these activities are relevant include: columnist, author, and psychiatrist.

VERBAL COMMUNICATIONS

Consider the usual writing and speaking activities required of the worker. Then, using the extent scale, indicate the extent of the activity to the job.

70C. (E)_____ Amount of Verbal Communication: Amount of verbal communication pertains to the quantity of verbal communication which the job requires. Activities involving significant amounts of verbal communication include: interviewing, counseling, teaching, discussing, selling, questioning, responding, etc. Job examples for which these activities are relevant include: lecturer, teacher, receptionist, and telephone operator.

71C. (E)_____ Amount of Written Communication: Amount of written communication pertains to the quantity or amount of written verbal communication which the job requires. Activities involving significant amounts of written communication include: newspaper reporting, taking dictation, typing, etc. Job examples for which these activities are relevant include: columnist, secretary, and typist.

SYMBOLIC AND NUMERICAL COMMUNICATIONS

Consider whether the incumbent performs the activities described below. Then, using the significance scale, indicate the significance of each activity to the job.

72C. (S)____ Numerical/Clerical Activities: Numerical/clerical activities pertain to the manipulation or handling of numbers in a clerical manner. Activities involving significant amounts of numerical/clerical content include: communication with numbers (such as part numbers); copying, verifying, and recording numbers; performing routine computations or calculations; etc. Job examples for which these activities are relevant include: billing-control clerk, bookkeeper I, tabulating machine operator, encoder (banking), statistical clerk, and stock clerk.

73C. (S)____ Technical/Symbolic Information Communication: Communication of technical/symbolic information pertains to the transmission of technical/symbolic information. Technical/symbolic information is communicated in chemical formulas; medical prescriptions; editing symbols; and the technical terms of electronics, chemistry, and physics. Jobs for which these activities are relevant include: nuclear engineer, college faculty member, organic chemist, and hydrologist.

74C. (S)____ Technical/Symbolic Information Processing: Processing of technical/symbolic information pertains to operations on and communication of technical verbal or numerical information. Technical/symbolic information is processed by analysis and synthesis. Analysis involves breaking down information by examination or mathematical operations. Synthesis involves organizing and integrating information to produce new information. Jobs for which these activities are relevant include: nuclear engineer, college faculty member, chemical engineer, and organic chemist.

75C. (S)____ Technical Drawing Activities: Technical drawing activities pertain to the use of devices to produce drawings which convey technical information. Technical drawing activities include: the use of drawing devices, T-squares, triangles, compasses, and dividers in order to produce blueprints, wiring diagrams, plans, maps, schematics, and other technical drawings. Job examples for which these activities are relevant include: nuclear

engineer, tool designer, engineering aide, draftsman, furniture designer, and surveyor.

76C. (S)_____ Communications by Signals: Signal communication pertains to the transmission of information by visual or auditory means such as hand signals, semaphore, bells, and lights. Activities involving significant amounts of signaling include: warning by bells, horn, or lights; telegraphing by bells to a ship's engine room; guiding a heavy equipment operator by hand signals; etc. Job examples for which these activities are relevant include: cargo agent, air traffic control specialist, and blast furnace operator.

III. INTERPERSONAL WORK BEHAVIOR

THIS SUBCATEGORY OF ITEMS DEALS WITH THE TYPES OF CONTACTS WITH OTHER PEOPLE WHICH ARE REQUIRED OF THE WORKER IN PERFORMANCE OF THE JOB.

INTERPERSONAL WORK BEHAVIOR

This subcategory of items deals with the types of contacts with other people which are required of the worker in performance of the job. For each item, rate the significance to the job of the type of contact described.

Supervisory Activities

77C. (S)_____ Supervisory Activities: Supervisory activities include both close and general supervision. Close supervision pertains to the incumbent frequently observing the activities of subordinates, specifying specific work objectives, and specifying specific means of achieving these objectives. General supervision pertains to the incumbent infrequently observing the activities of subordinates, specifying general work objectives, and allowing the subordinates to determine the means of achieving these goals. Supervisory activities include: organizing work activities of subordinates; evaluating, disciplining, hiring, transferring, promoting, and firing subordinates; controlling work behavior and output of subordinates; etc. Job examples for which these activities are relevant include: construction foreman, office manager, head waiter, research director, university dean, and corporation president.

Subordinate Activities

78C. (S)_____ Subordinate Activities: Subordinate activities pertain to work activities in which the incumbent occupies the role, position, or status of subordinate. Subordinate activities include: interacting with superiors and receiving directions from superiors, particularly directions which specify specific goals and/or specific means of accomplishing these goals. Relevant examples of jobs with a preponderance of subordinate relations include: first helper on electric furnace, electrician helper, welder helper, assembly line worker, and factory maintenance man helper.

79C. (S)_____ Assisting Superiors: Assisting superiors pertains to the incumbent providing support, help, or assistance to superiors in performing a task. Activities involving assisting superiors include: steadying work, giving and taking tools, preparing materials for work, etc.

Job examples for which these activities are relevant include: occupational therapy aide, surgical technician, dental assistant, airplane co-pilot, operating room nurse, baker helper, electrician helper, and welder helper.

Teaching/Consulting Activities

80C. (S)_____ Teaching/Instructing Activities: Teaching/instructing pertains to teaching subject matter or developing performance skills. Teaching/instructing activities include: interacting with students; developing skills in others; demonstrating and explaining products, procedures, or activities in order to convey information to others; etc. Job examples for which these activities are relevant include: college faculty member, art teacher, secondary school teacher, athletic coach, chief pilot, and occupational therapist.

81C. (S)_____ Consulting Activities: Consulting activities pertain to situations in which the incumbent acts as consultant. As consultant, the incumbent has influence over his client but does not have legitimate power over the client. Consulting activities involve providing others with information, advice, or opinions about subjects for which the incumbent is viewed as having expertise. Job examples for which these activities are relevant include: subject matter specialist, technical expert, psychiatrist, physician, and lawyer.

82C. (S)_____ Use of Consultants: Consultant usage pertains to obtaining information in a subject area for which the consultant is viewed as having expertise, such as a personnel services coordinator asking a computer expert for aid in programming a computer, a business executive seeking advice from a lawyer regarding a merger, or a research program director asking a statistician to evaluate a research proposal. Job examples for which the use of consultants is relevant include: personnel services coordinator, rehabilitation counselor, corporation executive, research coordinator, and lawyer.

Sales and Service Activities

83C. (S)_____ Sales Activities: Sales activities pertain to the selling of products or services through interaction with a customer. Sales activities include: persuading, demonstrating, interacting with customers, etc. Job examples

for which these activities are relevant include: home service representative (telephone and telegraph), gemologist, catering manager, and a variety of sales jobs.

84C. (S)____ Customer Service Activities: Customer service activities pertain to interacting with the public in relationships which are usually unstructured and transient, for the purpose of providing a service, such as filling an order, carrying luggage, taking a message, etc. Job examples for which these activities are relevant include: telephone-answering service operator, hotel recreation director, hotel clerk, restaurant hostess, baggage man, ticket clerk, teller, order clerk, (food and beverage), and passenger car conductor.

85C. (S)____ White-Collar Personal Service Activities: White-collar personal service activities pertain to the job of providing personal services in which verbal interaction (white-collar level) is emphasized. These activities include: entertaining, arranging entertainment, directing, debating, discussing, passifying, advising, etc. Job examples for which these activities are relevant include: claims adjuster, hotel recreation director, lawyer, credit manager, and policeman.

D. WORK GOALS

THIS CATEGORY OF ITEMS DEALS WITH WORK GOALS, OR OBJECTIVES. WORK OBJECTIVES ARE CONDITIONS WHICH THE WORKER IS FULLY OR PARTLY RESPONSIBLE FOR BRINGING ABOUT OR MAINTAINING, EITHER THROUGH HIS OWN WORK BEHAVIOR OR THROUGH DIRECT (ON-THE-SCENE) SUPERVISION OF THE WORK BEHAVIOR OF OTHERS. THUS, WORK OBJECTIVES (OR GOALS) CAN BE THOUGHT OF AS THE PRESCRIBED OUTCOMES OF THE INCUMBENT'S WORK--THINGS WHICH ARE SUPPOSED TO BE ACCOMPLISHED IN A JOB.

THE WORK-OBJECTIVE ITEMS ARE DIVIDED INTO THE FOLLOWING TEN GROUPS:

MECHANICAL OBJECTIVES
ELECTRICAL OBJECTIVES
INFORMATION OBJECTIVES
MATERIAL/OBJECT ARRANGEMENT OR MODIFICATION OBJECTIVES
ENVIRONMENTAL/EARTH OBJECTIVES
BIOLOGICAL/HEALTH OBJECTIVES
ART/DECORATIVE OBJECTIVES
SEMANTIC/SYMBOLIC OBJECTIVES
BUSINESS/ORGANIZATIONAL OBJECTIVES
OBJECTIVES RELATED TO PEOPLE

MECHANICAL OBJECTIVES

Consider whether the incumbent accomplishes or contributes directly to the accomplishment of the mechanical objectives described below. Then, using the significance scale, indicate the significance of the objectives to the job.

1D. (S)_____ Machine Operation: Machine operation pertains to being in contact with mechanical devices for the purpose of controlling, regulating or maintaining output. Examples of machine operation activities include: driving a truck or bus, landing a plane, operating a printing machine, etc. Job examples for which machine operation objectives are significant include: truck driver, airplane pilot, and production machine operator.

2D. (S)_____ Mechanical Maintenance: Mechanical maintenance pertains to coming in contact with mechanical devices for the purpose of installation, maintenance, or adjustment. Mechanical maintenance activities include: installing, operating, regulating, and maintaining mechanical devices. Particularly relevant to this dimension are activities involving detecting and correcting substandard mechanical conditions such as clogs, broken wires, noise, looseness, etc. Job examples for which these mechanical maintenance objectives are significant include: aircraft and engine mechanic, electrical appliance serviceman, packaging machine mechanic, building maintenance man, gas appliance serviceman, automobile service station mechanic, boat mechanic, and sewing machine repairman.

ELECTRICAL OBJECTIVES

Consider whether the incumbent accomplishes or contributes directly to the accomplishment of the electrical/electronic objectives described below. Then, using the significance scale, indicate the significance of the objectives to the job.

3D. (S)_____ Electrical/Electronic Objectives: Electrical/electronic objectives pertain to the physical manipulation of electrical/electronic components and/or devices. Examples of activities involving electrical/electronic objectives include: assembling, installing, operating, and maintaining electrical/electronic components or systems. Maintenance activities include detecting and correcting substandard conditions, as well as regulating and adjusting electrical/electronic devices. Job examples for which electrical/electronic objectives are significant include: electrical assembler, electronic technician, electrical appliance serviceman, electrician, substation operation, and communications electrician.

INFORMATION OBJECTIVES

Consider whether or not the incumbent accomplishes or contributes directly to the accomplishment of each of the information objectives described below. Then, using the significance scale, indicate the significance of the objectives to the job.

4D. (S)____ Mechanical Information: Mechanical information pertains to the production of information relating to mechanical devices or systems. Examples of activities involving mechanical information include: writing operating or maintenance instructions for a machine; designing and drawing plans for building, planning, and drawing the equipment layout for a shop; designing and drawing an engine; writing an article on mechanical or architectural principles; etc. Job examples for which mechanical information objectives are significant include: nuclear engineer, thermodynamics engineer, tool designer, production engineer, furniture designer, maintainability design engineer, and mechanical draftsman.

5D. (S)____ Electrical/Electronic Information: Electrical/electronic information pertains to the production of information relating to electrical/electronic systems or devices. Examples of activities involving the use of electrical/electronic information include: making innovations in an amplification system, planning a generating facility, making a survey to determine a community's power needs, writing descriptions of electrical circuits, drawing a schematic diagram of an electronic component, etc. Job examples for which electrical/electronic information is significant include: tests superintendent (light, heat, and power), public utilities salesman, market research analyst I, field engineer (electronics), electronic engineer, chief meter reader, and electronic technician.

MATERIAL/OBJECT ARRANGEMENT OR MODIFICATION OBJECTIVES

Consider whether the incumbent accomplishes or contributes directly to the accomplishment of the objectives defined below. Then, using the significance scales indicate the significance of the objectives to the job.

6D. (S)_____ Material Modification: Material modification pertains to surface finishing, removing material, or forming. Examples of material modification activities include: grinding, drilling, sanding, cutting, chipping, shearing, casting, and extruding. Job examples for which material modification objectives are significant include: dentist, shipfitter, carpenter, metal fabricator I, and cabinetmaker.

7D. (S)_____ Material Treatment: Material treatment pertains to the modification of materials and/or substances by heat, pressure, chemical action, or mechanical agitation. Examples of material treatment activities include: bleaching, fermenting, tanning, plating, irradiating, mixing, blending, and baking. Job examples for which material treatment activities are significant include: baker, polymerization foreman, extractor operator (solvent process), feed mill chief, and chemical operator III.

8D. (S)_____ Constructing/Building: Constructing/building objectives pertain to construction or building of structures or parts of structures. Examples of contructing/building activities include: building houses, constructing bridges or power line towers, building ships, building custom-made cabinets, etc. Job examples for which constructing/building activities are significant include: carpenter, mason, shipfitter, cabinetmaker, carpenter helper, plasterer, and pipe-making welder.

9D. (S)_____ Assembly and Inspection: Assembly and inspection pertains to assembling or fabricating objects and/or determining that the condition of these assembled objects is satisfactory. Examples of assembly and inspection activities include: assembling, fabricating, examining, inspecting, and testing. Job examples for which assembly and inspection activities are significant include: seamstress, electronics assembler, gluer II, hosiery mender, production department foreman (aerospace), and quality control director.

10D. (S)_____ Object Arrangement: Object arrangement pertains to locating or placing objects spatially. Examples of object arrangement activities include: arranging plants in a garden, merchandise in a show window, or equipment in a work area; and properly placing objects, such as shelving goods in a store or books in a library. Job examples for which object arrangement activities are significant include: retail sales manager, stock clerk, displayman, and bartender.

ENVIRONMENTAL/EARTH OBJECTIVES

Consider whether or not the incumbent accomplishes or contributes directly to the accomplishment of each of the objectives described below. Then, using the significance scale, rate the significance of the objectives to the job.

11D. (S)____ Water/Weather Conditions: Water/weather conditions pertain to work activities concerning water conditions and/or atmospheric conditions. Examples of activities involving water conditions include: controlling water pollution, preventing floods, irrigating, and analyzing samples of water. Examples of activities involving atmospheric conditions include: giving or receiving weather reports, seeding clouds, and detecting air pollution. Job examples for which water/weather condition objectives are significant include: hydrologist, microbiologist, chemical engineer, fish and game warden, plant operator, fishing vessel captain, weather forecaster, air pollution inspector, and astronomer.

12D. (S)____ Earth/Terrain Modification: Earth/terrain modification pertains to changing or modifying the terrain and/or movement of dirt, soil, or rock. Examples of earth/terrain modification activities include: dredging, ditch digging, bulldozing, earth moving, and blasting rock. Job examples for which these objectives are relevant include: operating engineer II (construction), logging manager, heavy equipment operator, power shovel operator, farmer, and forester.

BIOLOGICAL/HEALTH OBJECTIVES

Consider whether the incumbent accomplishes or contributes to the accomplishment of the objectives defined below. Then, using the significance scale, indicate the significance of the objectives to the job.

13D. (S)_____ Biological/Health Objectives: Biological/health objectives pertain to the manipulation of patients and/or biological materials such as tissue or blood samples, serums, vaccines, or cultures. Examples of activities involving biological/health objectives include: bathing patients, examining patients, changing dressings, taking blood samples, making blood counts, performing chemical analyses on biological samples, taking temperatures, filling teeth, etc. Job examples for which direct biological/health objectives are significant include: nurse, medical laboratory technician, dental hygienist, veterinarian, dentist, and physician.

14D. (S)_____ Biological/Health Information: Biological/health information objectaives pertain to obtaining, communicating, or utilizing biological/health information. Examples of activities involving biological or health information include: preparing or receiving a laboratory report, recording a patient's history, writing a biological research report, disseminating information about biological/health topics such as alcoholism or physical fitness, etc. Job examples for which indirect biological/health information objectives are significant include: medical laboratory technician, physician, psychiatrist, and veterinarian.

ART/DECORATIVE OBJECTIVES

Consider whether or not the incumbent accomplishes or contributes to the accomplishment of each of the objectives below. Then, using the significance scale, indicate the significance of the objectives to the job.

15D. (S)_____ Aesthetic Arrangement: Aesthetic arrangement pertains to placing or positioning objects or things so as to form pleasing or tasteful settings. Examples of activities involving aesthetic arrangement include: decorating a room, arranging furniture, landscaping a piece of property, and preparing a window display. Job examples for which aesthetic arrangement objectives are significant include: interior decorator, display man, landscape gardener, retail store manager, and stock supervisor.

SEMANTIC/SYMBOLIC OBJECTIVES

Consider whether the incumbent accomplishes the objectives defined below. Then, using the significance scale, indicate the significance of the objectives to the job.

16D. (S)____ Verbal/Clerical Objectives: Verbal/clerical objectives pertain to routine operations on verbal material. Examples of verbal/clerical activities include: transcribing dictation, typing copies, recording court proceedings, taking telephone messages, checking a letter for form or punctuation, checking for factual accuracy, sorting mail, and filing. Job examples for which verbal/clerical objectives are significant include: wires-transfer clerk, medical secretary, stenographer, transcribing machine operator, correspondence clerk, and mail clerk.

17D. (S)____ Numerical/Clerical Objectives: Numerical/clerical objectives pertain to standard or routine operations on numerical data. Examples of numerical/clerical activities include: recording, transcribing, or checking numerical data such as cash receipts and solving standard numerical problems such as calculating the total price of purchases. Job examples for which numerical/clerical objectives are significant include: bookkeeper I, head teller, payroll clerk, statistical clerk, teller (banking), and sales clerk.

18D. (S)____ Non-Routine Written Material: Non-routine written material pertains to the writing or editing of non-standard verbal material such as is contained in technical reports, newspaper articles, books, etc. Activities involving non-routine written materials include: writing technical reports, poetry, newspaper articles, books, and non-routine correspondence; reviewing or revising a speech or book according to publication standards, ethical standards, or newsworthiness. Job examples for which non-routine written material objectives are significant include: technical writer, author, editor, and poet.

19D. (S)____ Verbal Encoding: Verbal encoding pertains to the transformation of verbal information into symbols or codes. Examples of verbal encoding activities include: taking shorthand, writing a computer program, marking editorial signs for corrections on a manuscript, and encoding a

message in a cryptogram. Job examples for which verbal encoding objectives are significant include: stenographer, computer programmer, court clerk, editor, and cryptographer.

20D. (S)_____ Advanced Numerical Operations: Advanced numerical operations pertain to advanced or complex operations on numerical data. Examples of activities involving advanced numerical operations include: solving algebraic equations such as determining the number of square feet in an area, applying trigonometry as in determining distances in surveying, solving calculus problems as in computing stresses on a structure, and solving other problems requiring skills beyond basic arithmetic. Job examples for which advanced numerical operation objectives are significant include: architect, design engineer, surveyor, and interior decorator.

21D. (S)_____ Numerical Communications: Numerical communication pertains to the communication of numerical data. Numerical data can be communicated either orally or visually. Examples of numerical communication activities include: preparing numerical displays such as earnings charts, tables of numbers, census displays, or graphs of stock prices, and orally communicating numerical data such as giving a phone number, quoting a price, reporting the barometric pressure, or reporting a pilot's altitude. Job examples for which numerical communication objectives are significant include: head teller, accountant, statistical clerk, telephone operator, and weather forecaster.

22D. (S)_____ Representational Pictorial Objectives: Representational pictorial objectives pertain to the production of graphic materials such as diagrams, maps, or plans which convey information about relationships. Examples of activities involving representational pictorial objectives include: drawing building plans, preparing flow charts, diagraming landscape layouts or equipment layouts, and preparing maps or charts. Job examples for which representational pictorial objectives are significant include: mechanical draftsman, design engineer, architect, and landscape architect.

23D. (S)_____ Printing/Reproducing: Printing/reproducing pertains to producing copies of semantic or symbolic material. Examples of printing or reproducing activities include: photocopying, offset printing, copying by stenciling, and microfilm copying. Job examples for which printing or reproducing objectives are significant include: printer, offset machine operator, and secretary.

BUSINESS/ORGANIZATIONAL OBJECTIVES

Consider whether the incumbent accomplishes or contributes directly to the accomplishment of the objectives defined below. Then, using the significance scale, indicate the significance of the objectives to the job.

24D. (S)____ Business/Organizational Data: Business/organizational data objectives pertain to the collection or manipulation of business/organizational data such as data on cost, sales, production, etc. Examples of activities involving business or organizational data include: gathering, compiling, updating, verifying, balancing, and/or auditing business/organizational data such as sales, plant production, clients served, or student enrollment. Job examples for which business and organizational data objectives are significant include: bookkeeper, teller, statistical clerk, stock clerk, and accountant.

25D. (S)____ Organizational Objectives: Organizational objectives pertain to administration or management of organizations or businesses. Examples of organizational activities include: planning or innovating, such as planning expansion or implementing a new incentive plan; evaluating the success of these plans or innovations by such means as profit margins, turn-over rates, sales or production quotas, or growth rates; and communicating business/organizational information, as in annual reports or business correspondence. Job examples for which organizational objectives are significant include: corporation president, social welfare administrator, store manager, administrative assistant, and market research analyst.

26D. (S)____ Employee Relations: Employee relations objectives pertain to interacting with employees for the purpose of influencing behaviors, attitudes, and/or opinions. Examples of employee relation activities include: settling grievances; participating in negotiations with labor; establishing incentive pay, employee insurance, or retirement plans; and assessing employee morale. Job examples for which employee relation objectives are significant include: personnel services coordinator and all positions involving supervision of others.

27D. (S)_____ Advertising/Public Relations: Advertising/public relations objectives pertain to the gathering and dispensing of information in order to attract or influence a public. Examples of advertising or public relations activities include: developing favorable attitudes among customers or clientele as evidenced by return customers or favorable comments; obtaining news coverage favorable to the organization; and producing, displaying, or disseminating advertising material such as window displays or TV, radio, or newspaper advertisements. Job examples for which advertising or public relations objectives are significant include: public relations officer, advertising manager, commercial artist, and window display clerk.

28D. (S)_____ Merchandising: Merchandising pertains to displaying, inventorying, and dispensing goods or products. Examples of merchandising activities include: stocking store shelves, inventorying stock, filling customers' orders, and packaging orders. Job examples for which merchandising objectives are significant include: stock supervisor, display man, stock clerk, and checker I.

29D. (S)_____ Sales Objectives: Sales objectives pertain to the completion of business transactions such as the exchange of products or services for money. Examples of sales activities include: receiving payments, transferring deeds or titles, and signing contracts. Job examples for which sales objectives are significant include: accountant, bookkeeper, and sales personnel in all fields.

OBJECTIVES RELATED TO PEOPLE

Consider whether the incumbent accomplishes or contributes directly to the accomplishment of the objectives defined below. Then, using the significance scale, indicate the significance of each objective to the job.

30D. (S)_____ Assessing Others: Assessing others pertains to appraisal or evaluation of others in terms of their qualifications. Examples of assessing activities include: assessing knowledge with tests or by interviews, assessing adjustment or adaptation by observation or interview, and assessing physical competence by tests or competition. Job examples for which assessment objectives are significant include: rehabilitation counselor, psychiatrist, school teacher, occupational therapist, and credit manager.

31D. (S)_____ Planning for Others: Planning for others pertains to formulating future procedures, activities, or programs involving people. Examples of activities involving planning for others include: planning a counseling program, innovating a new teaching method or program, implementing changes resulting from research findings, etc. Job examples for which planning objectives are significant include: occupational therapist, teacher, social worker, physical therapist, psychiatrist, and rehabilitation counselor.

32D. (S)_____ Improving Others: Improvement of others pertains to bettering or enhancing the state or condition of other individuals. Examples of activities which involve improving others include: improving an individual's knowledge or skill by instructing or teaching; improving an individual's adjustment or adaptation by example, counseling, or advising; and improving an individual's physical competence of skills by instruction, example, or practice. Job examples for which objectives of improving others are significant include: occupational therapist, rehabilitation counselor, school teacher, psychiatrist, social worker, and physical therapist.

33D. (S)_____ Attitudinal Change: Attitudinal change pertains to altering or changing undesired attitudes and/or maintaining desired attitudes of others. Examples of attitudinal change activities include: modifying racial attitudes, changing students' attitudes in

order to motivate them toward learning, developing an "image" for a political candidate in order to influence the opinions of his constituency, changing or supporting a customer's product preference, changing or maintaining moods in order to obtain customer or client enjoyment or satisfaction, and developing or maintaining morale. Job examples for which attitudinal change objectives are significant include: public relations officer, advertising manager, salesman, recreation director, teacher, psychiatrist, and case worker.

34D. (S)____ Grooming: Grooming pertains to improving the appearance of people. Examples of grooming activities include: manicuring fingernails, styling hair, fitting clothes, coordinating attire, and improving carriage (posture, etc.) for improved appearance. Job examples for which grooming objectives are significant include: hair stylist, barber, fashion editor, and valet.

35D. (S)____ Conformance to Regulations: Conformity to regulations pertains to insuring or monitoring compliance with rules, regulations, or laws. Examples of activities insuring conformance to regulations include: police officer enforcing traffic regulations, foreman controlling work activities, official enforcing game rules, etc. Job examples for which conformance objectives are significant include: general foreman, teacher, corporation president, store manager, administrative assistant, police officer, and referee.

E. WORK CONTEXT

THIS CATEGORY IS CONCERNED WITH VARIOUS ASPECTS OF THE WORK SITUATION OR ENVIRONMENT (E.G., PHYSICAL CONTEXT, JOB STRUCTURE, SOCIAL CONTEXT, AND INCENTIVES). FOR EACH ITEM, INDICATE THE EXTENT TO WHICH THE CONDITIONS DESCRIBED APPLY TO THE JOB BEING RATED.

PHYSICAL CONTEXT

The following items deal with various aspects of the physical environment within which the incumbent works. For each item, indicate the extent to which the conditions described apply to the job being rated.

Location

1E. (E)_____ Outdoors: Outdoors pertain to being outside while conducting work activities where the incumbent is not protected from the weather by physical structures or enclosures. Job examples involving outdoor work to a great extent include: roofer, power lineman, jackhammer operator, switchman (railroad transportation), fishing vessel captain, and farmer.

Unpleasant Conditions

2E. (E)_____ Humid or Wet Working Conditions: Humid conditions pertain to excessive moisture content of the air, which is NOT a result of weather conditions, such as would result from working in Turkish baths and laundries. Wet conditions pertain to regular exposure to large amounts of water, such as would result from working on or under water, in car washes, or washing windows. Job examples involving humid or wet working conditions to a great extent include: wet wash assembler (laundry), ice maker, dairy processing equipment operator, pipe fitter (maintenance), Turkish bath attendant, and laundry steam press operator.

3E. (E)_____ Noise/Vibrations: Noises include the sound from jet engines, heavy earth-moving equipment, riveting machines, automatic punch presses, and sand blast units. Vibrations include vibrations of all or part of the body such as those resulting from such activities as driving heavy equipment, operating a pneumatic drill, riveting, etc. Job examples in which the incumbent is exposed to noise/vibrations to a great extent include: thimble press operator (ore refining), power shovel operator, jackhammer operator, arc welder, rotary driller helper, truck driver, and reveter.

4E. (E)_____ Dirty Environment: A dirty environment pertains to a situation in which the worker and his clothing are likely to become dirty, oily, or greasy as a result of working in coal mines, garages, foundries, etc. Job examples in which the incumbent is exposed to a dirty environment to a great extent include: thimble

press operator (ore refining), farmer, log stacker operator (sawmill), coal miner, auto mechanic, and floor and bench molder (foundry).

Temperature

5E. (E)_____ High Temperatures: High temperatures pertain to temperatures sufficiently high to cause bodily discomfort, such as would result from working in boiler rooms, working near furnaces or cooking vats, and fighting forest fires. Job examples in which the incumbent is exposed to high temperatures to a great extent include: furnace operator, first helper on an electric furnace, kiln burner, chef, fire fighter, arc welder, and baker.

6E. (E)_____ Low Temperatures: Low temperatures pertain to temperatures sufficiently low to cause bodily discomfort, even when appropriate clothing is worn, such as would result from working in refrigerated rooms or working at high altitudes. Job examples in which the incumbent is exposed to low temperatures to a great extent include: meat cutter, ice cutter, and meat packer.

7E. (E)_____ Suddenly Changing Temperatures: Sudden temperature changes pertain to temperature changes which are sufficiently marked and abrupt as to cause immediate bodily discomfort, such as might result from going in and out of refrigerated rooms or Turkish baths and going toward and away from furnaces, cooking vats, or fires, etc. Job examples in which the incumbent is exposed to sudden temperature changes to a great extent include: first helper on electric furnace, kiln burner, fire fighter, meat cutter, baker, and Turkish bath attendant.

Hazards

8E. (E)_____ Mechanical Hazards: Mechanical hazards pertain to the possibility of the incumbent's suffering serious bodily injury as a result of his use of machinery or mechanical equipment such as power saws and drills, punch presses, meat grinders, conveyor belts, etc. Job examples involving exposure to mechanical hazards to a great extent include: thimble press operator (ore refining), farmer, factory maintenance man helper, log stacker operator (sawmill), meat grinder, and lathe operator.

9E. (E)_____ Moving or Falling Objects: Moving or falling objects pertain to the possibility of the incumbent's suffering bodily injury as a result of moving or falling objects, such as being hit by a vehicle such as a tractor or forklift, objects falling from high places such as debris from construction sites or cargo being loaded onto a ship, or the incumbent himself falling from

high places. Job examples in which the incumbent is exposed to moving or falling objects to a great extent include: power shovel operator, switchman (railroad transportation), fire fighter, lineman, shipfitter, window washer, and farmer.

10E. (E)_____ Exposure to Burns: Exposure to burns pertains to the possibility of the incumbent's suffering serious injury as a result of burns, such as might result from working with or around fire, electricity, or other hot materials. Job examples which expose the incumbent to burns to a great extent include: furnace operator, first helper on an electric furnace, kiln burner, chef, fire fighter, arc welder, and baker.

11E. (E)_____ Other Hazards: Other hazards pertain to the possibility of the incumbent's suffering serious bodily injury or a definite danger to health as a result of miscellaneous hazards, such as might result from working under toxic conditions (e.g., dust, fumes, gases, etc.) or working with explosives, radiation, high speeds, etc. Job examples in which the incumbent is exposed to miscellaneous hazards to a great extent include: dope-dry house operator (explosives), power line repairman, dynamite cartridge crimper, patrolman, nuclear reactor operator, and grain stacker.

Apparel

12E. (E)_____ Protective Clothing: Protective clothing pertains to clothing such as coveralls, khakis, dungarees, and work clothes which protect the incumbent from spills, dirt, or chemicals; asbestos suits which protect against heat or fire; and armored vests, gloves, goggles, helmets, etc. Job examples involving the use of protective clothing to a great extent include: thimble press operator (ore refining), farmer, factory maintenance man helper, construction worker, fireman, lab technician, factory worker, and meat cutter.

13E. (E)_____ Business Attire: Business attire pertains to clothing such as business suits, dress uniforms, and other formal attire which serves no special function other than to clothe or identify the incumbent. Job examples involving the use of non-protective clothes to a great extent include: corporation president, airplane captain, columnist, military officer, policeman, insurance salesman, and secretary.

JOB STRUCTURE

The following items deal with the extent to which the incumbent's activities and schedule are restricted or prescribed by the nature of the job. For each item, indicate the extent to which the conditions described apply to the job being rated.

Job Structure

14E. (E)____ Work Procedures and Goals: Work procedures and goals pertain to prescribed methods of performing tasks, the types of material to be used, when and where the job is to be done, and what is to be accomplished or produced. An example of a job activity with prescribed procedures and goals is working on an assembly line, where the order of performing tasks, the types of materials to be used, and the time to complete the work are all prescribed. Job examples whose procedures and goals are prescribed or restricted to a great extent include: furnace operator, assembly line worker, elevator operator, battery assembler, pilar (foundry), and instrument adjuster.

15E. (E)____ Task Diversity: Task diversity pertains to jobs in which the incumbent seldom performs the same task twice. Examples of activities requiring task diversity include: painting portraits, sceneries, or murals, writing short stories, TV scripts, novels, or poetry; and sculpting. Job examples involving high task diversity to a great extent include: nuclear engineer, sculptor, artist, writer, corporation president, and public utilities commissioner.

Regularity

16E. (E)____ Steady Work Schedule: A steady work schedule pertains to a schedule which follows the same pattern from year to year, involves the same hours, and does not vary as a result of season, weather, or production demands. Job examples involving steady work schedules to a great extent include: secretary, teacher, public utilities commissioner, and light cleaner.

17E. (E)_____ Changing Shift Work: Changing shift work pertains to a situation in which the incumbent's work hours vary from day to day or week to week according to a systematic plan--for example, two weeks of day hours alternating with two weeks of night or evening hours. Job examples involving changing shift work to a great extent include: passenger car conductor (railroad transportation), airline stewardess, ticket agent, airplane captain, and assembly-line worker.

18E. (E)_____ Irregular or Seasonal Work Schedule: An irregular work schedule involves working at jobs which depend upon weather, season, or production demands (e.g., construction work, farming, fruit picking); or in which working hours vary from day to day or week to week but not according to a systematic plan (e.g., insurance sales, the ministry, etc.). Job examples involving irregular work activities to a great extent include: construction worker, fishing vessel captain, press box custodian, insurance salesman, clergyman, farmer, and fruit picker.

19E. (E)_____ Distractions: Distractions pertain to the incumbent's being interrupted or distracted by other workers, superiors, customers, telephone calls, emergency signals, etc. Job examples involving distractions to a great extent include: fountain girl, bartender, airline stewardess, credit manager, and receptionist.

Consequences of Errors

20E. (E)_____ Safety Consequences of Errors: Safety consequences of errors pertain to the probability that an error on the part of the incumbent will result in physical harm to himself or other persons, such as might result from dropping a jar of nitroglycerine, having a traffic accident, shooting a gun, etc. Job examples involving safety consequences of errors to a great extent include: dope-dry house operator (explosives), powder line repairman, patrolman, log stacker operator, race car driver, bus driver, and airplane captain.

21E. (E)_____ Financial/Intangible Consequences of Error: Financial or intangible consequences of errors pertain to the probability that an error on the part of the incumbent is LIKELY to cost the organization. The cost may be tangible and considered in terms of monetary loss or intangible, such as loss of reputation; failure of the

incumbent to up-date his knowledges, techniques, or skills; or failure in human relations tasks. Job examples in which errors are likely to involve losses to the organization to a great extent include: corporation president, college president, press secretary, physician, and commercial airplane pilot.

SOCIAL CONTEXT

The following items deal with various situations which comprise the social environment in which the incumbent works. Indicate for each item the extent to which the conditions described apply to the job being rated.

Personal Contact

22E. (E)_____ Working Alone: Working alone pertains to situations in which the incumbent works by himself and has little or no opportunity for social interaction--such as might result from plowing a field, driving a truck across the country, guarding a warehouse at night, etc. Job examples involving working alone to a great extent include: farmer, warehouseman, watchman, long distance truck driver, and lighthouse keeper.

23E. (E)_____ Working Individually in the Presence of Others: Working individually in the presence of others pertains to situations in which the incumbent works individually in the presence of co-workers where social interaction is possible but not a part of the job. Examples of working alone in the presence of others might include: a secretary assigned to one of a number of desks located in one room or an assembly line worker performing one specified task. Job examples involving working individually in the presence of others to a great extent include: core laborer (foundry), instrument adjuster, exterminator, secretary, receptionist, assembly line worker, and telephone operator.

24E. (E)_____ Team Work: Team work pertains to situations in which the incumbent works jointly with others as a part of a team where social interaction and cooperation are necessary. Examples of team work include a nurse handing sutures, scalpels, or scissors to a doctor who is performing an operation; a pilot and co-pilot reading a checklist; etc. Job examples involving team work to a great extent include: electrician helper, surgical technician, surveyor, operating room nurse, and airplane captain.

25E. (E)_____ Working in a One-to-One Relationship: Working in a one-to-one relationship pertains to situations in which the incumbent works or deals directly with a customer, client, student, etc., where social interaction is

restricted primarily to that person (e.g., waiting on a customer, cutting hair, giving vocational counseling). Job examples involving working in a one-to-one relationship to a great extent include: passenger car conductor (railroad transportation), telegrapher, fountain girl, bartender, ticket agent, claims adjuster, credit manager, barber, physician, and guidance counselor.

Conflict Situations

26E. (E)____ Unpleasant/Conflict Situations: Unpleasant or conflict situations pertain to the probability that the incumbent is likely to be found in situations involving other people and which are unpleasant and/or involve conflict. Unpleasant/conflict situations include: handling customer complaints, bargaining with a customer over the price of a product, arresting a law violator, negotiating a contract, and dealing with bereaved persons. Job examples involving unpleasant/conflict situations to a great extent include: embalmer, claims adjuster, farm foreman, bank manager, recreation director, and credit manager.

Social Obligations

27E. (E)____ Civic Obligations: Civic obligations pertain to situations in which the incumbent is required to participate in community activities (e.g., selling light bulbs for a charity, participating in a community fish fry to raise money). Job examples involving participation in community activities to a great extent include: branch bank manager, credit manager, corporation president, columnist, politician, and educator.

INCENTIVES

This category of items deals with various factors--either inherent in the job, associated with being in the job, or externally provided for performance in the job--which a worker may associate with satisfaction or reward and strive to attain. Indicate the extent to which this job provides each of the following incentives.

Existence: Incentives which relate to the incumbent's security, physical well being, and satisfaction.

28E. (E)_____ Job Security: Assurance that one's job or income is steady and does not depend upon seasonal fluctuations, fluctuations in the economic situation, etc.

29E. (E)_____ Physical Working Conditions: Overall acceptability or pleasantness of the physical working conditions, including such factors as freedom from hazards, comfortable temperature, proper illumination, low noise level, attractive surroundings, etc.

30E. (E)_____ Job Structure: Predictable and orderly job activities, free from unusual or ambiguous situations.

31E. (*)_____ Compensation: Indicate the level which best describes the monetary compensation received from this job.

0 - Much Below Average (domestic worker, farm laborer, nurse's aide, etc.)

1 - Below Average (file clerk, department store sales clerk, short-order waitress, etc.)

2 -

3 - Slightly Below Average (policeman, secretary, fireman, draftsman, etc.)

4 -

5 - Slightly Above Average (plumber, machinist, auto salesman, computer programmer, etc.

6 -

7 - Above Average (architect, professional engineer, research scientist, etc.)

8 -

9 - Much Above Average (surgeon, corporation president, orthodontist, etc.)

Relatedness: Incentives which pertain to or affect interpersonal relations with others.

32E. (E)____ Chance to Help Others: Opportunity to work with people to improve their well being; opportunity to do things for others.

33E. (E)____ Social Relationships: Opportunity to establish and maintain rewarding social relationships with other persons or groups in the work situation.

34E. (E)____ Inside Recognition: Opportunity to have one's work accomplishments singled out or acknowledged within his work organization.

35E. (E)____ Outside Recognition: Opportunity to have one's work singled out or acknowledged outside the work organization (by the community, by professional organizations, etc.).

36E. (E)____ Prestige: Status or standing accorded incumbent by virtue of his occupying this job position. (Examples of jobs which are high in prestige include: physician, lawyer, college professor, minister, etc.)

Achievement and Self-Esteem: Incentives resulting from work accomplishments which affect one's self-image.

37E. (E)____ Authority: Opportunity to direct or control the activities of others by virtue of one's position.

38E. (E)____ Advancement: Opportunity for promotion or other form of advancement as a result of accomplishments in the present position.

39E. (E)____ Job Performance Information: Opportunity for the incumbent to receive frequent information concerning the adequacy of his performance. This evaluation may be based on the incumbent's own observation or on information from other persons.

40E. (E)____ Responsibility: Opportunity to exercise one's own judgment, to make decisions, and to be accountable for the effects of one's decisions and actions.

Self-Actualization: Incentives relating to the opportunity for the incumbent to grow in the job and become what he is capable of becoming in terms of occupational potential.

41E. (E)_____ Creativity: Opportunity to apply one's initiative, ingenuity, and creativity to a work situation; opportunity to produce new and original products and ideas; opportunity to apply one's own ideas. Examples of occupations providing opportunity for creativity include: school teacher, artist, research scientist, beauty operator, etc.

42E. (E)_____ Utilization of Abilities: Opportunity to participate in activities which make full use of one's abilities; work that is challenging in terms of skill, knowledge, or mental ability. (In rating the job, think in terms of the abilities of the "average" person.)

43E. (E)_____ Independence: Opportunity to plan and direct one's own activities rather than be directed by others; to be free of supervision.

44E. (E)_____ Personal Development: Opportunity for personal growth and development; opportunity to develop one's occupational skills and knowledges in order to reach one's full occupational potential. (In rating the job, think in terms of the developmental potential of the "average" person.)

APPENDIX B

LIST OF ATTRIBUTE REQUIREMENT INVENTORY TITLES

General Vocational Capabilities

Tools
Mechanical Systems
Stationary Machine and Equipment Operation
Vehicular Operation
Connections and Fittings
Fluid Systems
Measuring Instruments
Electricity
Layout and Visualization
Structures
Materials
Chemicals
Foods and Cooking
Biological Systems
Medical and First Aid
Arithmetic Computation
Arithmetic Conventions
Clerical
Verbal Communication
Sales
Service
Dealing with Social Situations
Etiquette and Social Grace
Style and Grooming

Cognitive Abilities

Closure
Form Perception
Perceptual Speed
Spatial Scanning
Spatial Orientation
Visualization
Number Facility
Memory
Verbal Comprehension
Grammar
Spelling
Expressional Fluency
Ideational Fluency
Sensitivity to Problems
Deductive Reasoning
Inductive Reasoning
Originality
Social Intelligence
Aesthetic Judgment
Musical Aptitude

Psychomotor Abilities

Control Precision
Multilimb Coordination
Reaction Time
Eye-Hand Coordination
Manual Dexterity
Finger Dexterity
Arm-Hand Steadiness
Explosive Strength
Static Strength
Dynamic Strength
Body Equilibrium
Stamina

Sensory Capacities

Near Visual Acuity
Far Visual Acuity
Depth Perception
Color Discrimination
Auditory Acuity
Tactual Discrimination

Interests

Manual Work
Machine Work
Personal Service
Care of People or Animals
Clerical Work
Inspecting and Testing
Crafts and Precise Operations
Customer Services
Nursing and Related Technical Services
Skilled Personal Services
Training
Literary
Numerical
Appraisal
Agriculture
Applied Technology
Promotion and Communication
Management and Supervision
Artistic
Sales Representative
Music
Entertainment and Performing Arts
Teaching, Counseling, and Social Work
Medical

Needs

Ability Utilization
Achievement
Activity
Advancement
Authority
Compensation
Co-Workers
Creativity
Independence
Moral Values
Recognition
Responsibility
Security
Social Service
Social Status
Variety
Working Conditions

APPENDIX C

INTER-RATER RELIABILITY COEFFICIENTS OF 90 FIRST-ORDER FACTORS DERIVED FROM THE OAI

Table 7. Inter-Rater Reliability Coefficients of 90 First-Order Factors Derived from the OAI (n = 215 jobs)

Factor Number	Number of Raters(n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
1	2	.938	.884	.940	.887
2	2	.863	.759	.863	.760
3	2	.897	.813	.897	.814
4	2	.708	.548	.722	.565
5	2	.803	.671	.808	.678
6	2	.900	.818	.900	.819
7	2	.700	.538	.723	.566
8	2	.715	.557	.733	.579
9	2	.921	.854	.923	.857
10	2	.864	.761	.869	.769
11	2	.818	.692	.819	.694
12	2	.887	.796	.887	.797
13	2	.883	.791	.883	.791
14	2	.865	.762	.866	.764
15	2	.497	.331	.496	.330
16	2	.819	.694	.829	.707
17	2	.517	.348	.515	.346
18	2	.735	.581	.734	.580
19	2	.639	.469	.643	.473
20	2	.790	.653	.789	.652
21	2	.784	.645	.784	.644
22	2	.802	.669	.803	.670
23	2	.821	.696	.821	.696
24	2	.832	.712	.832	.713
25	2	.784	.644	.783	.643
26	2	.583	.412	.585	.414
27	2	.859	.753	.865	.762
28	2	.812	.683	.812	.683
29	2	.913	.840	.917	.847
30	2	.723	.566	.728	.572
31	2	.628	.458	.636	.466
32	2	.924	.859	.924	.859
33	2	.783	.643	.782	.642
34	2	.875	.777	.874	.777
35	2	.611	.440	.615	.444
36	2	.827	.705	.827	.705
37	2	.919	.850	.920	.852
38	2	.887	.797	.887	.797
39	2	.657	.489	.655	.487
40	2	.874	.777	.874	.776

Table 7. Continued

Factor Number	Number of Raters(n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
41	2	.857	.750	.856	.749
42	2	.807	.676	.818	.692
43	2	.751	.601	.750	.600
44	2	.857	.750	.857	.749
45	2	.667	.501	.666	.499
46	2	.887	.796	.887	.797
47	2	.877	.781	.883	.791
48	2	.875	.778	.875	.777
49	2	.884	.793	.887	.797
50	2	.855	.747	.856	.749
51	2	.837	.720	.843	.728
52	2	.525	.356	.524	.355
53	2	.716	.558	.720	.563
54	2	.887	.797	.888	.798
55	2	.826	.704	.827	.705
56	2	.717	.559	.720	.562
57	2	.570	.399	.598	.427
58	2	.869	.769	.869	.768
59	2	.866	.763	.865	.762
60	2	.727	.571	.726	.570
61	2	.677	.512	.688	.525
62	2	.871	.771	.871	.771
63	2	.910	.835	.911	.836
64	2	.862	.757	.863	.759
65	2	.821	.697	.824	.701
66	2	.814	.686	.813	.685
67	2	.683	.518	.684	.519
68	2	.873	.775	.873	.775
69	2	.802	.669	.802	.670
70	2	.864	.761	.864	.760
71	2	.849	.737	.849	.737
72	2	.849	.738	.848	.737
73	2	.816	.690	.817	.691
74	2	.821	.697	.821	.696
75	2	.864	.760	.863	.759
76	2	.780	.639	.784	.645
77	2	.581	.409	.579	.408
78	2	.832	.712	.832	.712
79	2	.842	.727	.844	.730
80	2	.759	.612	.759	.611

Table 7. Continued

Factor Number	Number of Rat rs(n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
81	2	.481	.317	.495	.329
82	2	.910	.834	.909	.834
83	2	.748	.597	.751	.602
84	2	.722	.565	.721	.564
85	2	.803	.671	.809	.679
86	2	.875	.777	.874	.776
87	2	.917	.847	.919	.850
88	2	.565	.394	.596	.424
89	2	.747	.596	.754	.605
90	2	.575	.403	.592	.420

APPENDIX D

RELIABILITY ESTIMATES OF OAI SHORT FORM ITEMS BASED ON OCCUPATIONAL RATING DATA

Table 8. Reliability Estimates of OAI Short Form Items Based on Occupational Rating Data

OAI:SF Item Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
1A	4	.893	.676	.894	.678
2A	4	.896	.683	.896	.683
3A	4	.907	.710	.908	.711
4A	4	.909	.713	.908	.712
5A	4	.888	.664	.889	.668
6A	4	.664	.330	.695	.363
7A	4	.897	.685	.897	.684
8A	4	.646	.313	.656	.323
9A	4	.828	.545	.848	.583
10A	4	.825	.540	.829	.548
11A	4	.658	.325	.657	.324
12A	4	.913	.723	.914	.726
13A	4	.862	.610	.863	.613
14A	4	.862	.611	.869	.624
15A	4	.824	.540	.826	.542
16A	4	.904	.703	.904	.702
17A	4	.918	.736	.918	.737
18A	4	.814	.522	.820	.533
19A	4	.869	.623	.875	.636
20A	4	.841	.569	.853	.591
21A	4	.916	.730	.923	.750
22A	4	.836	.560	.859	.604
23A	4	.916	.731	.916	.733
24A	4	.886	.660	.889	.667
25A	4	.901	.695	.904	.702
26A	4	.899	.689	.902	.696
27A	4	.890	.669	.890	.670
28A	4	.819	.531	.819	.532
29A	4	.664	.331	.757	.438
30A	4	.872	.629	.871	.629
31A	4	.708	.378	.790	.484
32A	4	.855	.597	.885	.659
33A	4	.849	.584	.895	.681
34A	4	.765	.449	.771	.457
35A	4	.867	.620	.873	.632
36A	4	.835	.558	.839	.567
37A	4	.822	.536	.824	.538
38A	4	.644	.311	.648	.315
1B	4	.580	.257	.658	.324
2B	4	.030	.008	.533	.222
3B	4	.819	.531	.856	.598
4B	4	.849	.585	.860	.607
5B	4	.696	.364	.740	.416
6B	4	.917	.735	.920	.743
7B	4	.867	.619	.877	.641
8B	4	.229	.069	.347	.117

Table 8. Continued

OAI:SF Item Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
9B	4	.329	.109	.577	.254
10B	4	.876	.638	.882	.652
11B	4	.688	.355	.722	.393
12B	4	.890	.668	.894	.678
13B	4	.804	.506	.820	.532
14B	4	.789	.483	.842	.571
15B	4	.812	.518	.836	.560
16B	4	.762	.444	.804	.507
17B	4	.678	.345	.799	.498
18B	4	.799	.498	.817	.528
19B	4	.816	.526	.840	.567
20B	4	.810	.517	.833	.555
21B	4	.762	.445	.798	.497
22B	4	.751	.429	.774	.461
23B	4	.919	.739	.921	.745
24B	4	.872	.631	.874	.635
25B	4	.949	.822	.950	.826
26B	4	.723	.395	.732	.405
27B	4	.785	.478	.810	.516
1C	4	.409	.147	.762	.444
2C	4	.629	.298	.678	.325
3C	4	.786	.478	.820	.532
4C	4	.561	.242	.722	.394
5C	4	.673	.339	.808	.512
6C	4	.773	.460	.831	.552
7C	4	.516	.210	.620	.289
8C	4	.516	.210	.619	.289
9C	4	.853	.593	.871	.628
10C	4	.368	.127	.693	.361
11C	4	.857	.600	.873	.632
12C	4	.416	.151	.420	.153
13C	4	.813	.521	.818	.530
14C	4	.888	.664	.890	.670
15C	4	.943	.805	.953	.834
16C	4	.797	.495	.852	.589
17C	4	.769	.454	.772	.459
18C	4	.704	.373	.802	.503
19C	4	.860	.605	.875	.637
20C	4	.514	.209	.546	.231
21C	4	.725	.397	.740	.416
22C	4	-.253	-.053	.562	.243
23C	4	.922	.747	.923	.751
24C	4	.893	.677	.894	.678
25C	4	.827	.545	.830	.549
26C	4	.874	.635	.876	.638
27C	4	.881	.648	.881	.650
28C	4	.926	.758	.926	.757

Table 8. Continued

OAI:SF Item Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
29C	4	.896	.682	.897	.686
30C	4	.826	.543	.828	.547
31C	4	.900	.693	.902	.697
32C	4	.894	.678	.895	.680
33C	4	.845	.577	.846	.579
34C	4	.786	.479	.795	.492
35C	4	.865	.616	.867	.619
36C	4	.938	.791	.939	.795
37C	4	.838	.563	.844	.574
38C	4	.685	.352	.684	.351
39C	4	.934	.780	.935	.781
40C	4	.889	.668	.892	.674
41C	4	.886	.661	.886	.660
42C	4	.928	.765	.928	.764
43C	4	.732	.406	.781	.472
44C	4	.857	.599	.863	.611
45C	4	.879	.645	.881	.649
46C	4	.932	.775	.934	.779
47C	4	.964	.869	.965	.873
48C	4	.757	.438	.761	.443
49C	4	.733	.407	.776	.464
50C	4	.926	.757	.926	.758
51C	4	.941	.801	.942	.803
52C	4	.828	.546	.838	.564
53C	4	.795	.492	.819	.531
54C	4	.945	.810	.946	.816
55C	4	.917	.735	.917	.735
56C	4	.974	.905	.975	.905
57C	4	.929	.767	.929	.767
58C	4	.895	.680	.895	.680
59C	4	.942	.803	.942	.802
60C	4	.897	.686	.898	.687
61C	4	.824	.539	.823	.537
62C	4	.928	.764	.929	.765
63C	4	.878	.644	.879	.644
64C	4	.966	.877	.966	.878
65C	4	.837	.563	.836	.561
66C	4	.944	.808	.944	.809
67C	4	.606	.277	.610	.281
68C	4	.777	.466	.857	.601
69C	4	.840	.568	.860	.606
70C	4	.924	.753	.944	.808
71C	4	.850	.585	.875	.637
72C	4	.879	.645	.881	.649
73C	4	.804	.506	.805	.508
74C	4	.800	.500	.809	.514
75C	4	.915	.728	.915	.728

Table 8. Continued

OAI:SF Item Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
76C	4	.793	.489	.807	.511
77C	4	.922	.747	.926	.759
78C	4	.705	.374	.812	.519
79C	4	.686	.354	.698	.366
80C	4	.874	.635	.885	.659
81C	4	.812	.520	.815	.525
82C	4	.605	.277	.605	.277
83C	4	.925	.756	.928	.762
84C	4	.866	.618	.878	.642
85C	4	.698	.366	.700	.368
1D	4	.900	.693	.901	.694
2D	4	.898	.688	.899	.691
3D	4	.926	.759	.927	.761
4D	4	.907	.709	.907	.710
5D	4	.811	.517	.810	.516
6D	4	.922	.748	.922	.748
7D	4	.847	.580	.850	.586
8D	4	.893	.675	.893	.676
9D	4	.845	.576	.847	.580
10D	4	.738	.414	.759	.440
11D	4	.768	.453	.771	.456
12D	4	.908	.712	.909	.714
13D	4	.940	.796	.940	.797
14D	4	.928	.762	.929	.766
15D	4	.865	.616	.868	.621
16D	4	.913	.723	.915	.730
17D	4	.912	.722	.913	.723
18D	4	.786	.479	.798	.498
19D	4	.879	.644	.885	.658
20D	4	.798	.497	.817	.527
21D	4	.821	.533	.826	.543
22D	4	.903	.700	.903	.699
23D	4	.833	.555	.840	.567
24D	4	.918	.737	.920	.742
25D	4	.882	.651	.884	.656
26D	4	.898	.687	.900	.693
27D	4	.893	.676	.895	.681
28D	4	.834	.557	.840	.568
29D	4	.908	.712	.911	.719
30D	4	.922	.748	.924	.752
31D	4	.869	.624	.874	.634
32D	4	.902	.697	.904	.702
33D	4	.732	.406	.754	.434
34D	4	.952	.834	.952	.833
35D	4	.866	.618	.879	.646
1E	4	.971	.893	.972	.897
2E	4	.908	.713	.910	.717

Table 8. Continued

OAI:SF Item Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
3E	4	.757	.437	.829	.548
4E	4	.825	.541	.865	.616
5E	4	.763	.445	.796	.493
6E	4	.681	.348	.682	.349
7E	4	.516	.211	.556	.238
8E	4	.883	.654	.894	.679
9E	4	.717	.388	.756	.436
10E	4	.885	.657	.887	.663
11E	4	.787	.480	.825	.540
12E	4	.738	.414	.836	.561
13E	4	.858	.601	.889	.668
14E	4	.845	.576	.852	.590
15E	4	.849	.584	.906	.706
16E	4	.585	.261	.605	.277
17E	4	.669	.336	.702	.370
18E	4	.825	.541	.839	.566
19E	4	.768	.452	.813	.521
20E	4	.889	.667	.897	.686
21E	4	.791	.486	.810	.517
22E	4	.592	.266	.662	.329
23E	4	.793	.490	.817	.527
24E	4	.869	.624	.885	.658
25E	4	.922	.747	.928	.762
26E	4	.882	.650	.899	.689
27E	4	.612	.283	.711	.381
28E	4	.673	.340	.725	.397
29E	4	.802	.503	.860	.606
30E	4	.735	.409	.771	.457
31E	4	.898	.687	.931	.771
32E	4	.910	.717	.924	.752
33E	4	.670	.337	.735	.409
34E	4	.134	.037	.673	.340
35E	4	.787	.480	.809	.514
36E	4	.809	.514	.893	.675
37E	4	.920	.743	.930	.769
38E	4	.644	.311	.692	.360
39E	4	-.074	-.018	.038	.010
40E	4	.835	.559	.885	.658
41E	4	.846	.578	.899	.689
42E	4	.769	.454	.897	.685
43E	4	.877	.641	.894	.677
44E	4	.759	.441	.883	.654

APPENDIX E

RELIABILITY ESTIMATES OF ATTRIBUTE REQUIREMENT RATINGS

Table 9. Reliability Estimates of Attribute Requirement Ratings

Attribute Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
1	4	.927	.760	.928	.762
2	4	.683	.350	.687	.354
3	4	.869	.623	.868	.622
4	4	.891	.672	.892	.673
5	4	.829	.547	.836	.560
6	4	.368	.127	.381	.133
7	4	.869	.625	.870	.626
8	4	.964	.871	.965	.875
9	4	.855	.596	.860	.606
10	4	.813	.521	.814	.522
11	4	.869	.625	.874	.633
12	4	.825	.542	.833	.554
13	4	.897	.685	.897	.686
14	4	.940	.796	.941	.799
15	4	.889	.666	.890	.669
16	4	.698	.366	.720	.392
17	4	.672	.339	.681	.348
18	4	.876	.638	.879	.646
19	4	.828	.547	.845	.577
20	4	.856	.598	.858	.602
21	4	.767	.452	.772	.458
22	4	.789	.483	.794	.491
23	4	.643	.310	.668	.334
24	4	.729	.403	.735	.409
25	4	.705	.373	.722	.394
26	4	.726	.399	.739	.415
27	4	.508	.205	.567	.247
28	4	.560	.241	.586	.262
29	4	.802	.503	.808	.513
30	4	.784	.476	.792	.488
31	4	.845	.577	.850	.587
32	4	.398	.142	.515	.210
33	4	.794	.490	.822	.535
34	4	.866	.617	.866	.618
35	4	.880	.646	.883	.653
36	4	.713	.383	.740	.416
37	4	.504	.203	.539	.226
38	4	.659	.326	.683	.350
39	4	.644	.312	.668	.334
40	4	.472	.183	.492	.195
41	4	.729	.402	.735	.410
42	4	.879	.645	.882	.651
43	4	.945	.810	.945	.811
44	4	-.020	-.005	-.018	-.005
45	4	.803	.505	.807	.510
46	4	.721	.392	.746	.423
47	4	.559	.241	.648	.315

Table 9. Continued

Attribute Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
48	4	.718	.389	.745	.421
49	4	.882	.651	.892	.674
50	4	.822	.536	.846	.579
51	4	.804	.506	.827	.545
52	4	.869	.623	.873	.631
53	4	.862	.611	.867	.620
54	4	.722	.393	.747	.424
55	4	.876	.639	.886	.661
56	4	.745	.421	.770	.456
57	4	.787	.480	.807	.511
58	4	.793	.489	.798	.497
59	4	.733	.407	.756	.437
60	4	.902	.698	.903	.699
61	4	.705	.374	.738	.413
62	4	.751	.430	.777	.466
63	4	.769	.455	.798	.496
64	4	.864	.614	.871	.629
65	4	.874	.635	.878	.643
66	4	.859	.603	.859	.604
67	4	.877	.641	.885	.659
68	4	.907	.710	.908	.712
69	4	.728	.401	.757	.438
70	4	.815	.524	.821	.534
71	4	.740	.415	.743	.419
72	4	.795	.492	.799	.498
73	4	.669	.336	.691	.358
74	4	.715	.386	.740	.416
75	4	.867	.620	.867	.620
76	4	.518	.212	.537	.225
77	4	.820	.533	.845	.576
78	4	.676	.342	.708	.378
79	4	.600	.273	.642	.309
80	4	.745	.422	.778	.467
81	4	.826	.542	.831	.551
82	4	.816	.526	.831	.552
83	4	.693	.361	.697	.365
84	4	.664	.331	.670	.337
85	4	.809	.514	.826	.542
86	4	.834	.557	.874	.635
87	3	.229	.090	.521	.266
88	3	.227	.089	.423	.197
89	3	.143	.053	.458	.220
90	3	.512	.259	.524	.268
91	3	.733	.477	.739	.485
92	3	.957	.882	.957	.882
93	3	.581	.316	.610	.342
94	3	.727	.470	.747	.497

Table 9. Continued

Attribute Number	Number of Raters (n)	Unadjusted Correlation Coefficient for (n) Raters	Unadjusted Intraclass Correlation Coefficient	Adjusted Correlation Coefficient for (n) Raters	Adjusted Intraclass Correlation Coefficient
95	3	.760	.514	.766	.522
96	3	.560	.298	.572	.308
97	3	.770	.528	.775	.534
98	3	.648	.380	.671	.405
99	3	.554	.293	.614	.346
100	3	.877	.704	.881	.711
101	3	.656	.389	.667	.400
102	3	.586	.321	.613	.345
103	3	.294	.122	.383	.171

APPENDIX F

CORRELATION OF ATTRIBUTE-REQUIREMENT ESTIMATES FROM THE OAI: SHORT FORM WITH ATTRIBUTE-REQUIREMENT ESTIMATES FROM THE OAI: LONG FORM (ACROSS 150 JOBS)

Table 10. Correlation of Attribute-Requirement Estimates from the OAI: Short Form with Attribute-Requirement Estimates from the OAI: Long Form (Across 150 Jobs)

Attribute Number	Correlation OAI:SF Estimates with OAI:LF Estimates
1	.845
2	.815
3	.809
4	.779
5	.831
6	.719
7	.736
8	.884
9	.857
10	.852
11	.749
12	.756
13	.732
14	.930
15	.943
16	.851
17	.836
18	.820
19	.879
20	.802
21	.849
22	.864
23	.875
24	.792
25	.622
26	.770
27	.846
28	.503
29	.740
30	.828
31	.857
32	.828
33	.883
34	.838
35	.845
36	.884
37	.819
38	.732
39	.843
40	.849
41	.843
42	.872
43	.850
44	.731
45	.799
46	.786
47	.692

Table 10. Continued

Attribute Number	Correlation OAI:SF Estimates with OAI:LF Estimates
48	.784
49	.811
50	.758
51	.802
52	.848
53	.855
54	.814
55	.707
56	.831
57	.686
58	.729
59	.776
60	.710
61	.791
62	.778
63	.804
64	.794
65	.868
66	.920
67	.830
68	.699
69	.784
70	.829
71	.889
72	.733
73	.852
74	.877
75	.809
76	.769
77	.696
78	.766
79	.868
80	.877
81	.756
82	.760
83	.723
84	.745
85	.863
86	.879
87	.808
88	.806
89	.645
90	.808
91	.865
92	.719
93	.766
94	.764
95	.834

Table 10. Continued

Attribute Number	Correlation OAI:SF Estimates with OAI:LF Estimates
96	Attribute not Estimated with OAI:Long Form
97	.805
98	.806
99	.557
100	.898
101	.892
102	.839
103	.788

APPENDIX G

CORRELATION OF OAI: SHORT FORM FACTOR SCORE ESTIMATES WITH OAI: LONG FORM FACTOR SCORES (ACROSS 133 OCCUPATIONS)

Table 11. Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations)

Factor Number	Correlation OAI:SF Factor Score Estimates with OAI:LF Factor Scores
1	.850
2	.762
3	.847
4	.479
5	.779
6	.920
7	.397
8	.561
9	.774
10	.744
11	.823
12	.729
13	.786
14	.770
15	.187
16	Factor was not Estimated on OAI Short Form
17	.550
18	.397
19	.623
20	.759
21	.702
22	.809
23	.784
24	.633
25	.525
26	.456
27	.803
28	.682
29	.673
30	.808
31	.219
32	.761
33	.635
34	.740
35	.168
36	.700
37	.661
38	.685
39	.592
40	.793
41	.655
42	.379
43	.420
44	.514
45	Factor was not Estimated on OAI Short Form
46	.427
47	.845

Table 11. Continued

Factor Number	Correlation OAI:SF Factor Score Estimates with OAI:LF Factor Scores
48	.805
49	.802
50	.747
51	.529
52	.530
53	.254
54	.790
55	.684
56	.330
57	.403
58	.606
59	.764
60	.352
61	.487
62	.812
63	.807
64	.883
65	.682
66	.750
67	.717
68	.897
69	.405
70	.702
71	.605
72	.731
73	.763
74	.802
75	.392
76	.359
77	.497
78	.719
79	.809
80	.351
81	.699
82	.300
83	.578
84	.692
85	.706
86	.579
87	.779
88	.364
89	.500
90	.453

APPENDIX H

CORRELATION OF OAI: SHORT FORM FACTOR SCORE ESTIMATES WITH OAI: LONG FORM FACTOR SCORES (ACROSS 133 OCCUPATIONS) CORRECTED FOR ATTENUATION DUE TO RATER UNRELIABILITY IN OAI FACTOR SCORES

Table 12. Correlation of OAI: Short Form Factor Score Estimates with OAI: Long Form Factor Scores (Across 133 Occupations) Corrected for Attenuation due to Rater Unreliability in OAI Factor Scores

Factor Number	Correlation OAI: SF Factor Score Estimates with OAI: LF Factor Scores Corrected for Attenuation
1	.878
2	.820
3	.894
4	.569
5	.869
6	.970
7	.475
8	.663
9	.807
10	.800
11	.910
12	.774
13	.836
14	.028
15	.265
16	Factor was not Estimated on OAI Short Form
17	.765
18	.463
19	.779
20	.854
21	.793
22	.903
23	.865
24	.694
25	.593
26	.597
27	.866
28	.757
29	.704
30	.950
31	.276
32	.792
33	.718
34	.791
35	.215
36	.770
37	.690
38	.727
39	.730
40	.848
41	.708

Table 12. Continued

Factor Number	Correlation OAI: SF Factor Score Estimates with OAI: LF Factor Scores Corrected for Attenuation
42	.422
43	.485
44	.555
45	Factor was not Estimated on OAI Short Form
46	.453
47	.902
48	.861
49	.853
50	.808
51	.578
52	.731
53	.300
54	.839
55	.753
56	.390
57	.534
58	.650
59	.821
60	.413
61	.592
62	.870
63	.846
64	.951
65	.753
66	.831
67	.868
68	.960
69	.452
70	.755
71	.657
72	.793
73	.845
74	.885
75	.422
76	.406
77	.652
78	.788
79	.882
80	.403
81	1.008
82	.314
83	.668
84	.814
85	.788
86	.619
87	.813
88	.484
89	.579
90	.597